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THE MICRO USER

Volume 2
Number 9
November 1984
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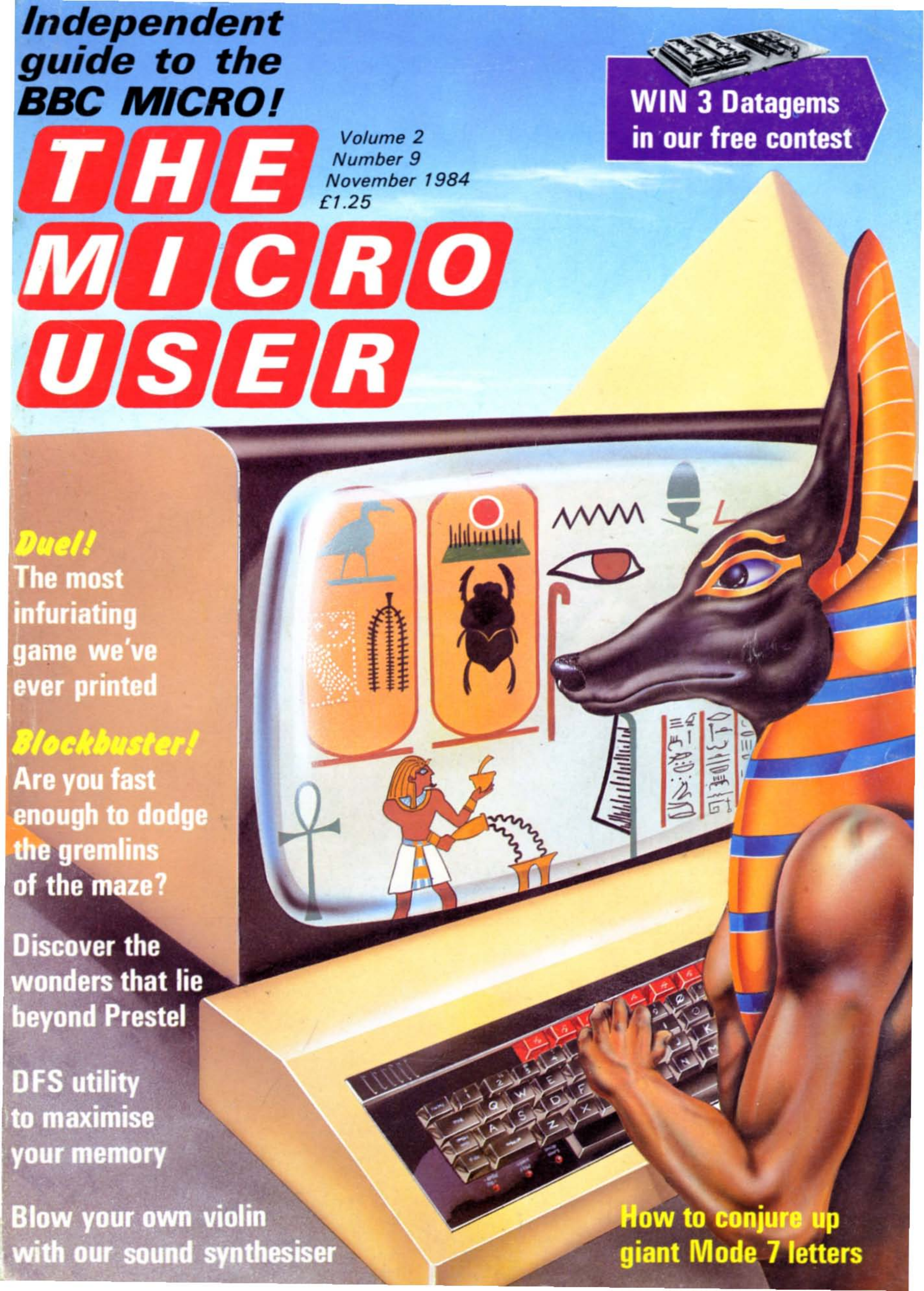

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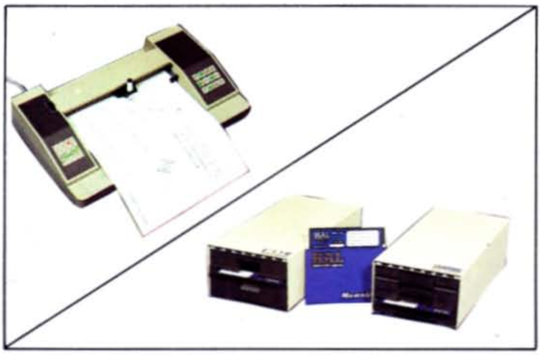

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THE MICRO USER

presents two great games

BLOCK BUSTER

There's an intriguing blend of speed and strategy in this game of relentless pursuit.

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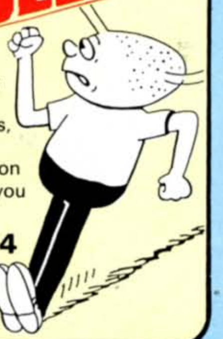
DUEL!



The classic game for two players, its high-paced action will keep you enthralled.

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mixed moods
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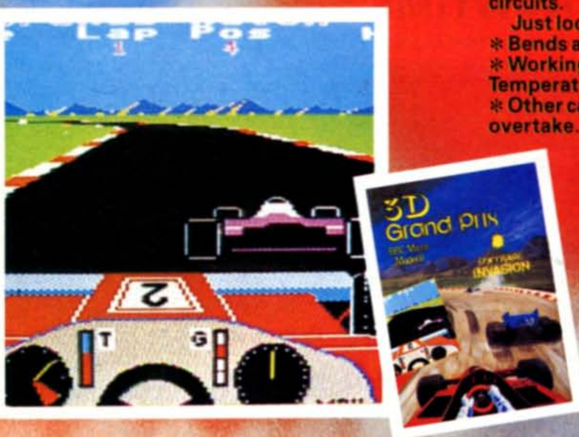
3D Grand Prix



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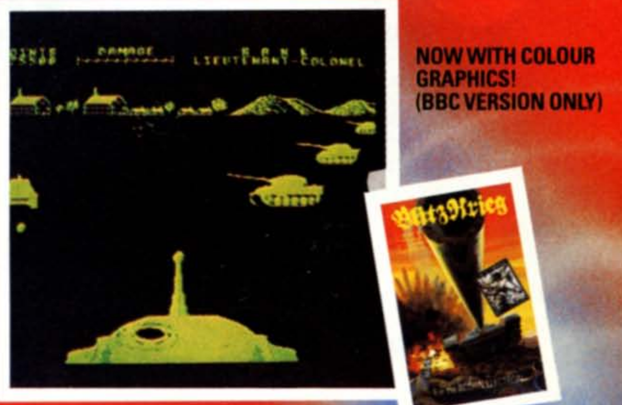
Blitzkrieg



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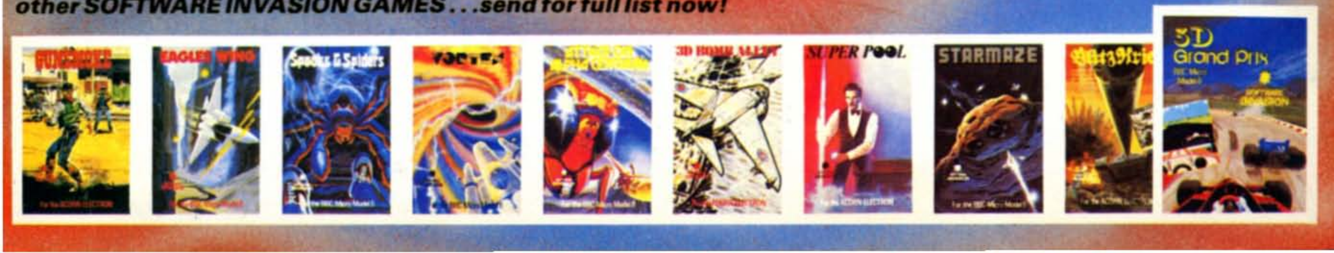

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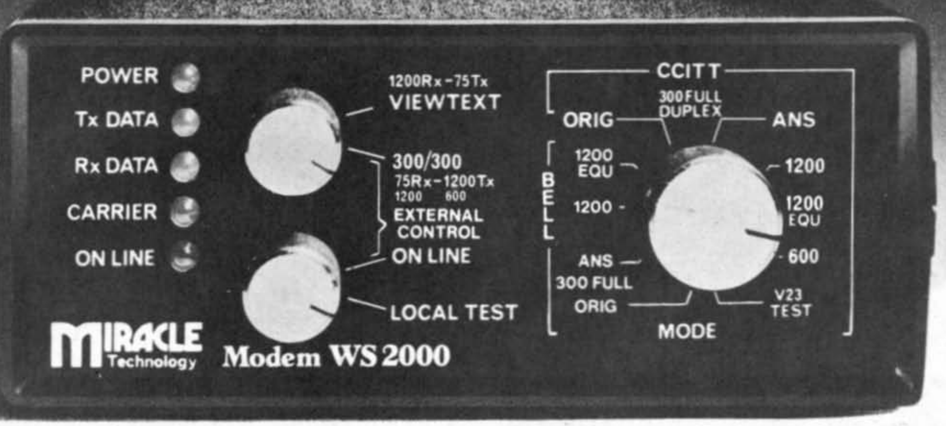
Skywave SOFTWARE

MULTI-FORTH 83 FOR THE BBC MICRO

Outstanding Modem WS2000

the only modem you'll ever need to buy.

WS2000 brings 1990's modem technology to you NOW! Link across the world – your computer to mainframes, to Prestel, Micronet, Easylink Telex, Telecom Gold, to other computer users anywhere.


POWER
Tx DATA
Rx DATA
CARRIER
ON LINE
1200Rx-75Tx
VIEWTEXT
300/300
75Rx-1200Tx
1200 600
EXTERNAL CONTROL
ON LINE
LOCAL TEST
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Modem WS 2000

Trade enquiries invited

Software packages

Off-the-shelf dedicated software packs for most major computers: DataTalk for IBM PC/PCXT, VICOM for colour Prestel plus bulletin boards on Apple, many packages for BBC, Commodore and other computers. WS2000 covers the field.

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"This modem is so simple to use." – Miss VAB of Bristol.

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"Very versatile; good value." Peter Tootill, PCW.

"Could turn out to be the peripheral you can't live without." Ralph Bancroft, PCN.

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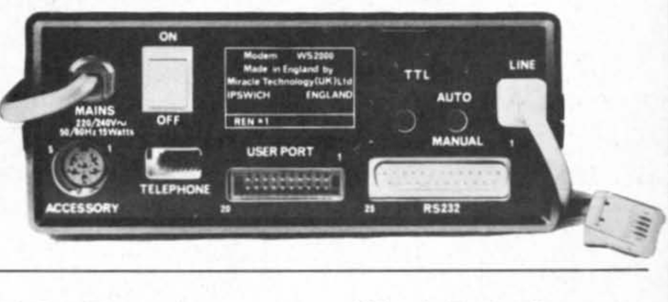
WS2000 can grow to suit your needs! The modem's unique User Port lets a computer access all the modem's functions – full software control is possible. Auto answer and auto dial plug-in accessories let your computer accept and initiate telephone calls. TTL interfacing, acoustic coupling, battery back-up, process control interfacing – they're all possible for the WS2000 owner.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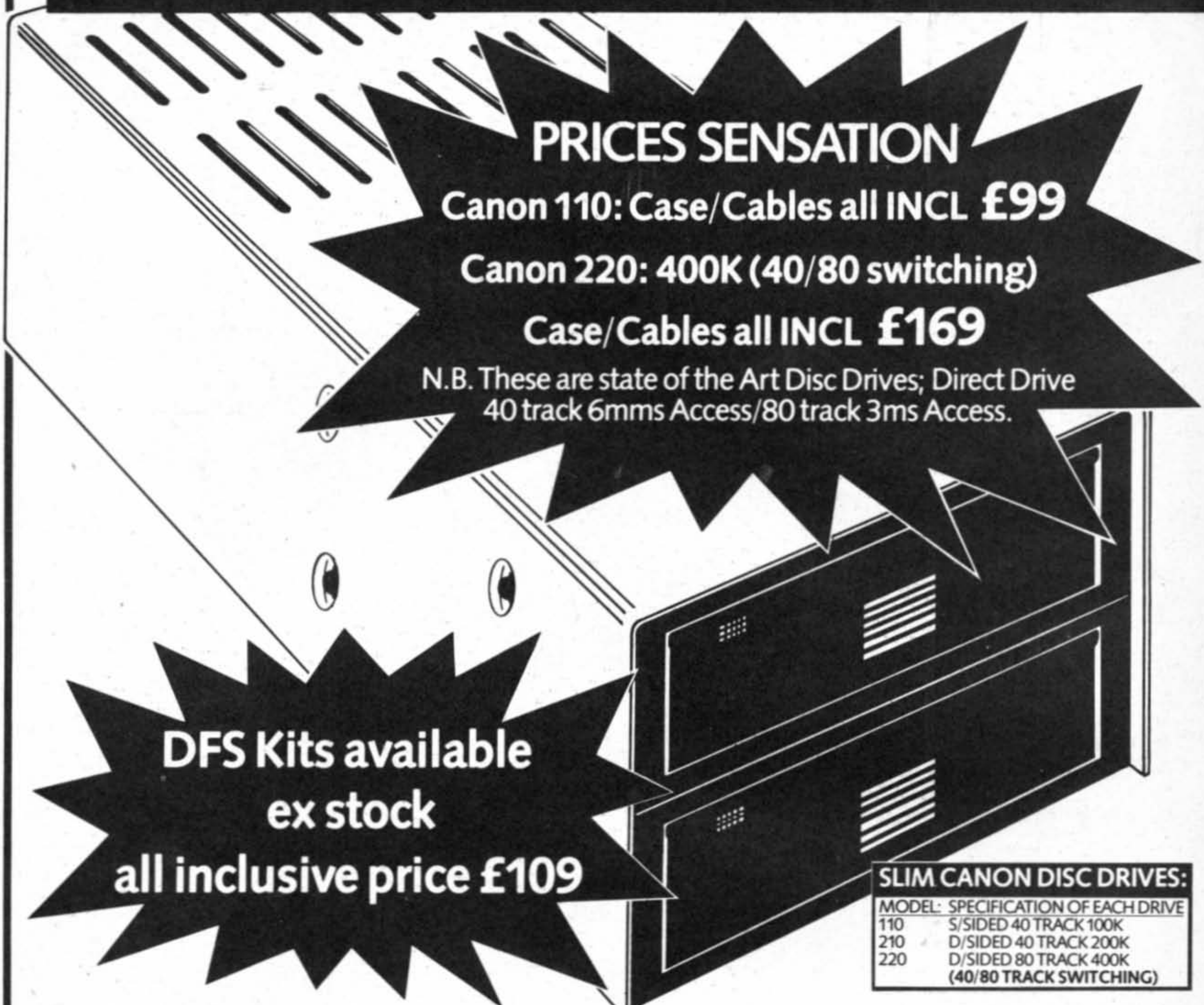


PRICES SENSATION

Canon 110: Case/Cables all INCL £99

Canon 220: 400K (40/80 switching)

Case/Cables all INCL £169

N.B. These are state of the Art Disc Drives; Direct Drive 40 track 6mms Access/80 track 3ms Access.

DFS Kits available ex stock all inclusive price £109

SLIM CANON DISC DRIVES:

MODEL:	SPECIFICATION OF EACH DRIVE
110	S/SIDED 40 TRACK 100K
210	D/SIDED 40 TRACK 200K
220	D/SIDED 80 TRACK 400K **(40/80 TRACK SWITCHING)**

- All **CANON** 40/80 switchable disc drives feature an on-board dual-colour LED on the front panel to show track mode selected. This is coupled with our own unique two-stage illumination, to give a clear operating status, as follows:

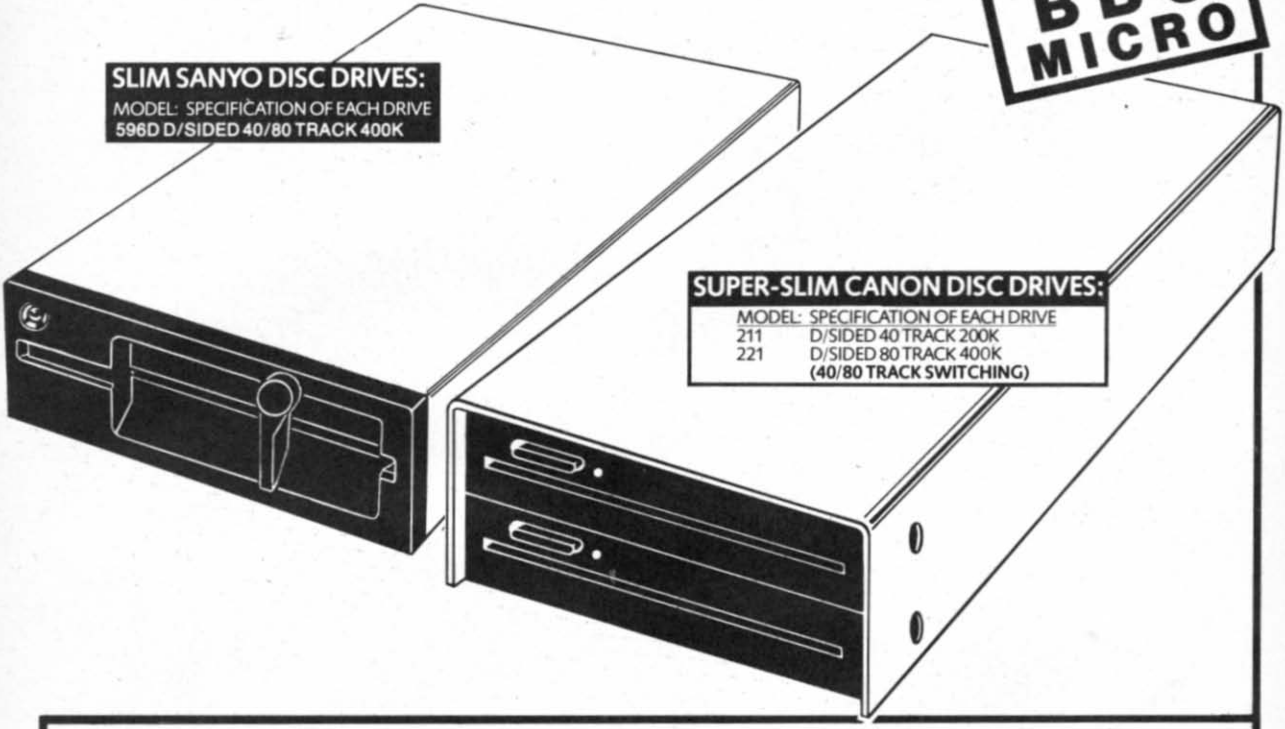
40 TRACK MODE:	LED GREEN	
80 TRACK MODE:	LED RED	
POWER ON:	HALF-ILLUMINATION	(GREEN OR RED)
DRIVE SELECTED	FULL-ILLUMINATION	(GREEN OR RED)

- Super-slim **CANON** drives, models 211 and 221 and the **SANYO** model 596D are available with their own **custom-built secondary switching power supply.** This is safe, low in heat generation and excellent value for money.

- The **SANYO** disc drive is our latest acquisition in quality Japanese products. This is a "half-height" unit of standard dimensions.

LTD DISC DRIVES

FOR THE BBC MICRO



SLIM SANYO DISC DRIVES:

MODEL:	SPECIFICATION OF EACH DRIVE
596D	D/SIDED 40/80 TRACK 400K

SUPER-SLIM CANON DISC DRIVES:

MODEL:	SPECIFICATION OF EACH DRIVE
211	D/SIDED 40 TRACK 200K
221	D/SIDED 80 TRACK 400K **(40/80 TRACK SWITCHING)**

All inclusive price list:

This means: disc drive + case + all power & data cables + U.K. carriage + utilities disc & manual + V.A.T.

	CANON					SANYO
MODEL:	**110**	**210**	**220**	**211**	**221**	**596D**
Formatted Capacity per drive on BBC Micro:	**100k**	**200k**	**400k**	**200k**	**400k**	**400K**
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ENHANCED

BETA-BASE £25 DISC
8 GREAT FEATURES

WHAT IS A DATABASE?

It is a FILE which contains RECORDS. Records consist of a number of FIELDS containing the information—an analogy can be drawn with a card index in which a box of cards is the file. Each card is a record and each line on the card is a field.

SPECIFICATION

1) Random Access—disc based, single or dual drives
2) File Size—99K (40 track), 199K (80 track) —65,000 + records
3) Record Size—up to 2048 characters and 200 fields
4) Field Size—up to 254 characters with complete line scanning
5) Access any record using Primary Key in 2 seconds
6) Holds—1200 NAMES AND ADDRESS records on 100K disk
7) Search—500 records on 5 fields in 60 seconds
8) Sort—500 records on 3 fields in 60 seconds

SYSTEM FEATURES

- CALCULATE—using any valid expression and store results
- POWERFUL PRINTOUT OPTION—Eliminates need for separate mailing program, Parallel/Serial Printout allows setting of printer control codes, line spacing, tabulation, Headings etc, plus label printing with horizontal and vertical tab control.
- REDEFINE—Titles, field widths, number of fields, number of records etc.
- TRANSFER—Records from one file to another.
- SEARCH LISTS—Allow creation of sub-Databases within main Database.

NEW ✱

✱ GLOBALENTRY enables repetitive data to be typed in once and placed in as many records as required. Can also be used with a search list to provide a powerful global edit/update facility that will save hours of typing.

✱ SPOOLER enables you to create spooled files that are compatible with Wordwise, View and other word processors. You can therefore present your data within a document or in varying formats etc. The spooler program will allow to format your spooled file in the same way as the print out option. You can therefore have headings, columns, titles, numbers etc.

✱ INPUT is a routine included on the disc which will allow you to write utilities for accessing your data and tailored specifically to your needs.

✱ TUBE compatible with the 6502 second processor.

✱ Comprehensive manual and tutorial. All timings and sizes are relative to ACORN DFS. Compatible with ACORN DFS, WATFORD 1.3 and latest AMCOM DFS SERIES B.

✱ ORIGINAL USERS send your disc plus £3 for up grade.

REPLICA II: £12.00. DISC

The original REPLICA set a very high standard so the specification we set our chief programmer included some impossible features. In fact ACORN state that some of the things that we have done are impossible, it just took us longer that's all. REPLICA II transfers most cassette based programs to disk, even more than REPLICA. When you buy disk drives you do not have to throw away expensive cassette based programs.

REPLICA II transfers 'LOCKED' programs, programs loading as files, programs that load below &EOO, those with up to 6 sections and those up to &6E in length eg adventure programs. No waiting for 6 minutes whilst adventure programs load.

REPLICA II is very easy to use. The user enters a name, how many sections and whether CHAIN,*RUN or *LOAD to load the first section. Press play and let the program do the rest, even a menu. Think how much it will cost you to buy just 1 disk version of your favourite program—REPLICA II which will hold up to 16 programs, limited only by the disk capacity.

FX 80 PRINTER DRIVER £12.00

PRINTER DRIVER FOR EPSON FX80 AND VIEW

Multi-page driver with print menu allowing the setting of global (document wide) printer functions at printer initialisation. The print menu program contains a sophisticated character generator which allows the construction of 95 user defined characters which are then accessible from VIEW via a highlight option. Supplied on disc with comprehensive user manual.

NEW

DISCDEX: £15.00 DISC

- Catalogues all your discs quickly and easily.
- Room to store four thousand titles.
- Quick search and load option.
- Compatible with single or dual drives.
- Extensive print options for catalogue and disc labels.
- Update and delete options.
- Supplied with stick on labels to number your discs and a supply of labels for printing your own disc labels.

DISCDEX is the answer to a disc users nightmare. How many times have you had to wade through your discs looking for the file that you know is there somewhere? Now with DISCDEX those days are gone.

DISCDEX will catalogue all your discs and store them in alphabetic order. In addition to the very useful search and load facility DISCDEX will also print out a full catalogue in alphabetic or disc order. Even more useful is the ability to print disc labels for sticking on the disc or the jacket.

DISCDEX is only suitable for discs with 31 file names as in the standard ACORN system. It is not suitable for double density interfaces.

NEW

ONESHOT: £12.00 DISC

- Full feature trace utility.
- Single step through BASIC program or halt at user determined interval.
- Print line number prior to execution.
- Obey fixed instructions before executing a line.
- Trace window allows screen to be seen whilst tracing execution.
- "Printer only" will force trace output to a printer allowing full screen display.
- Ability to dynamically alter control of ONESHOT.
- ONESHOT can be configured to run in any area of memory.

ONESHOT is a 1.25kb machine code program which gives the user several powerful aids in debugging BASIC programs. These include the ability to SINGLE STEP through the BASIC code of the target program, stopping the processing at specified points and comprehensive trace functions of the variables used by the target program.

A very powerful option allows the user to enter a command string into function key 0 and instruct ONESHOT to obey this command BEFORE each line is executed e.g. *KEY0 PRINT X%¦ M will print the value of X% before executing each line. This is a very simple example and it is possible to do much more complex things including printing the value of a variable only when it changes or when it reaches a certain value or falls within a certain range. This option can also be used to dynamically alter ONESHOT as it is working. The power of this option is only limited by the users ingenuity. In addition to ONESHOT the disc also contains 3 very useful function key routines. The first will search for any DEFPROC or DEFFN and print the line numbers in which they appear together with the name of the procedure or function. The second will search for a specific procedure or function and print the line numbers containing it. The third routine will print out every active variable together with its present value. ONESHOT is not compatible with double density interfaces.

NEW

FUN HOUSE: £10.00 DISC

FUN HOUSE is a highly original suite of educational programs suitable for ages 3 to 13. The program is designed to encourage children to spell words which relate to objects found around the home. Animation and music are used to good effect and some highly original ideas are incorporated. Each room exercise is terminated with a warning item e.g. the lounge finishes with 'FIRE' which goes on to engulf the whole lounge. Tests with a newly hired 4 year old resulted in us having to prise him away from the keyboard after 2 hours. In that time he had gone from never having used a keyboard to finding the location of all the keys very quickly and entering the correct answer. He had thus started on the path to learning spelling and familiarised himself with the keyboard including the use of DELETE to correct his mistakes. Can you afford not to give your children the same start?

FUN HOUSE is not compatible with double density interfaces.

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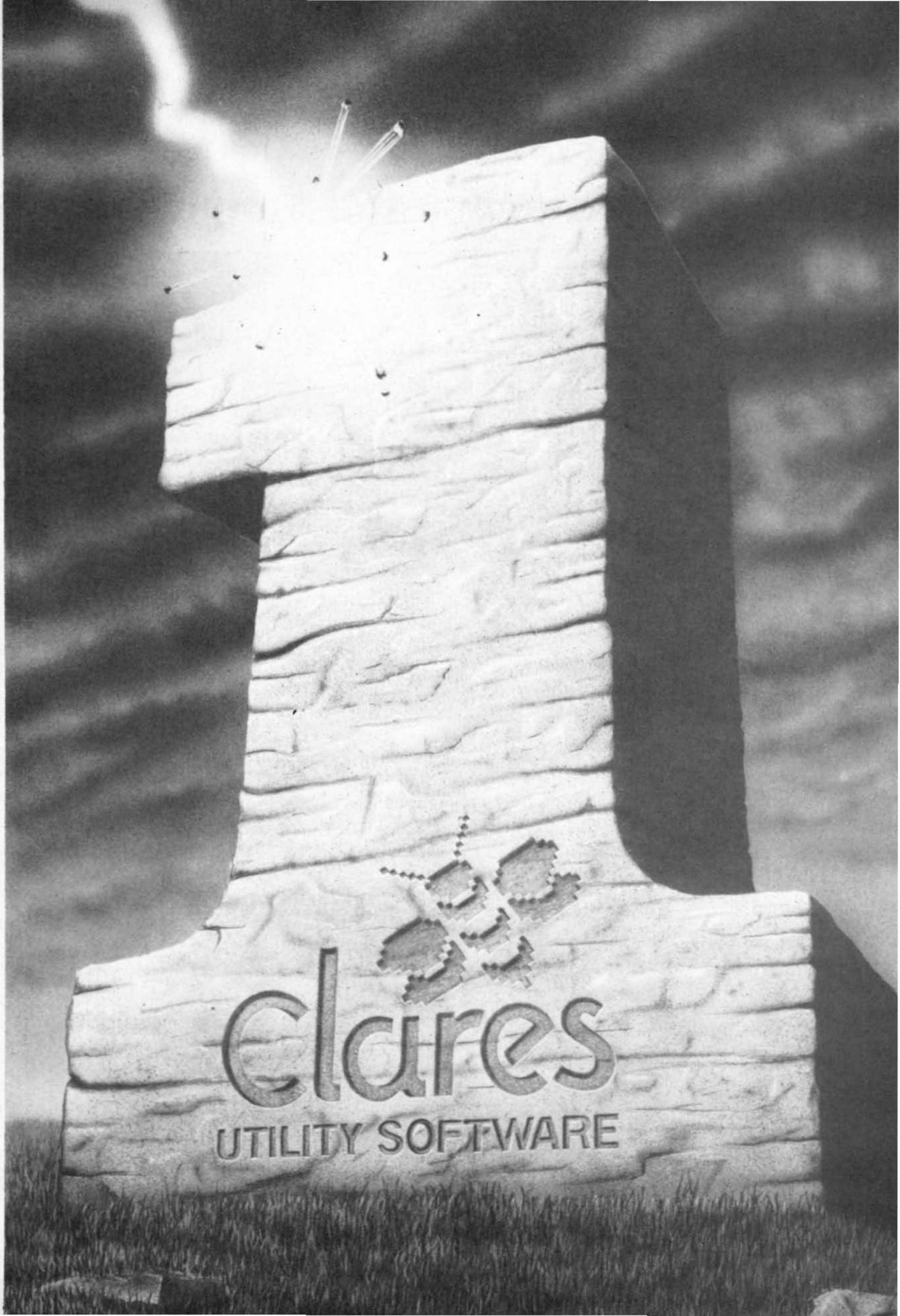
All Disc Software now available on 3" disc—add £3 to printed prices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If you're involved with education, then you're involved with hi-technology and computers.

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Exhibition

23-26 January, 1985
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The face of education is changing, monitors are replacing blackboards, light pens are replacing chalk.

As an educationalist take an opportunity to get right up to date with everything that's new in high technology and computers in education. The new techniques aren't only for the science labs or computer classes, they cover all aspects of the schools curriculum, from geography to physical training.

This exhibition, the first of its kind, is a definitive showcase for both manufacturers and users alike. You can see the best the world has to offer, compare specifications and collect literature away from the bustle of day to day activities.

Entrance is free to anyone working in education and over 18 years of age. Just clip the coupon below. (To be completely up-to-date, book into the series of half-day seminar/workshops organised alongside the exhibition in co-operation with the Micro-electroncs Education Programme. For details of these and a booking form, tick the box on the coupon below.)

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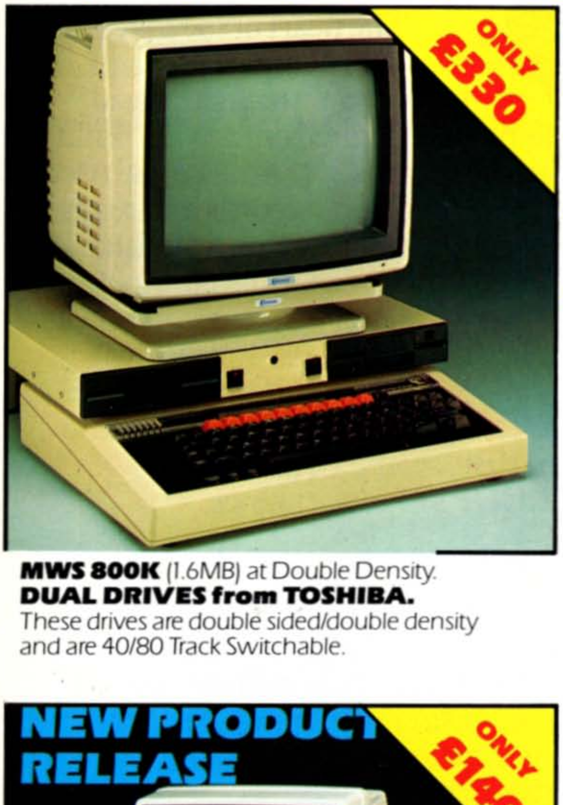
These drives are also double sided/double density and are 40/80 Track Switchable.



MWS 800K (1.6MB) at Double Density.
DUAL DRIVES from TOSHIBA.
These drives are double sided/double density and are 40/80 Track Switchable.

NEW PRODUCT
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MWS 200K.
A SINGLE DRIVE from EPSON.
These drives are double sided/single density and are 40 Track.

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All prices are exclusive of VAT.
Price includes Formatting Disc, Manual and all Cables.
All units carry a one year warranty.
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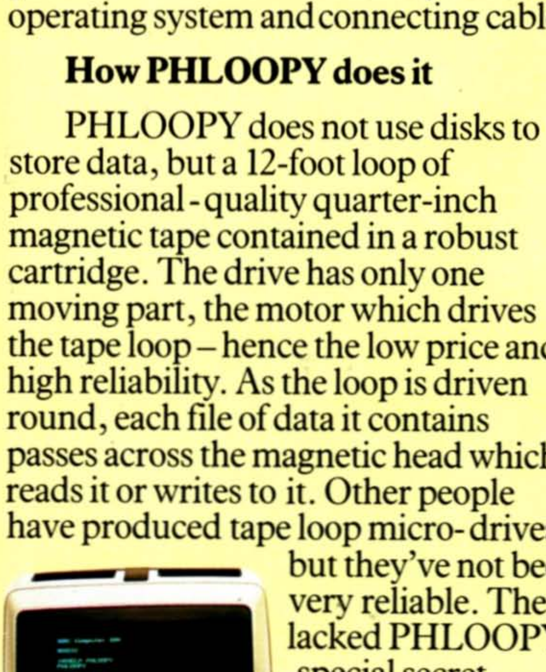
EUREK

A 100k BBC-drive for £99 + VAT

We've done it! We've built a mass storage system for your BBC Micro with the power and convenience of a floppy disk drive, but at a fraction the price. Get to know PHLOOPY, the remarkable new 100k drive that costs only £99 plus VAT, and a further £26 plus VAT for the interface to your BBC, operating system and connecting cables.

How PHLOOPY does it

PHLOOPY does not use disks to store data, but a 12-foot loop of professional-quality quarter-inch magnetic tape contained in a robust cartridge. The drive has only one moving part, the motor which drives the tape loop – hence the low price and high reliability. As the loop is driven round, each file of data it contains passes across the magnetic head which reads it or writes to it. Other people have produced tape loop micro-drives, but they've not been very reliable. They lacked PHLOOPY's special secret.



PHLOOPY's special secret

The heart of the invention is a brilliantly designed "byte-wide" magnetic head, made by Phi Magnetronics who build multi-track heads for professional use. PHLOOPY's head records and reads nine tracks across the width of a quarter-inch tape. That means the tape loop can be much shorter, so the typical time to access a file is reduced to a mere 3 seconds. If you're used to waiting for a cassette tape to trundle programs into your BBC, you'll be amazed at PHLOOPY's performance.

Getting it right every time

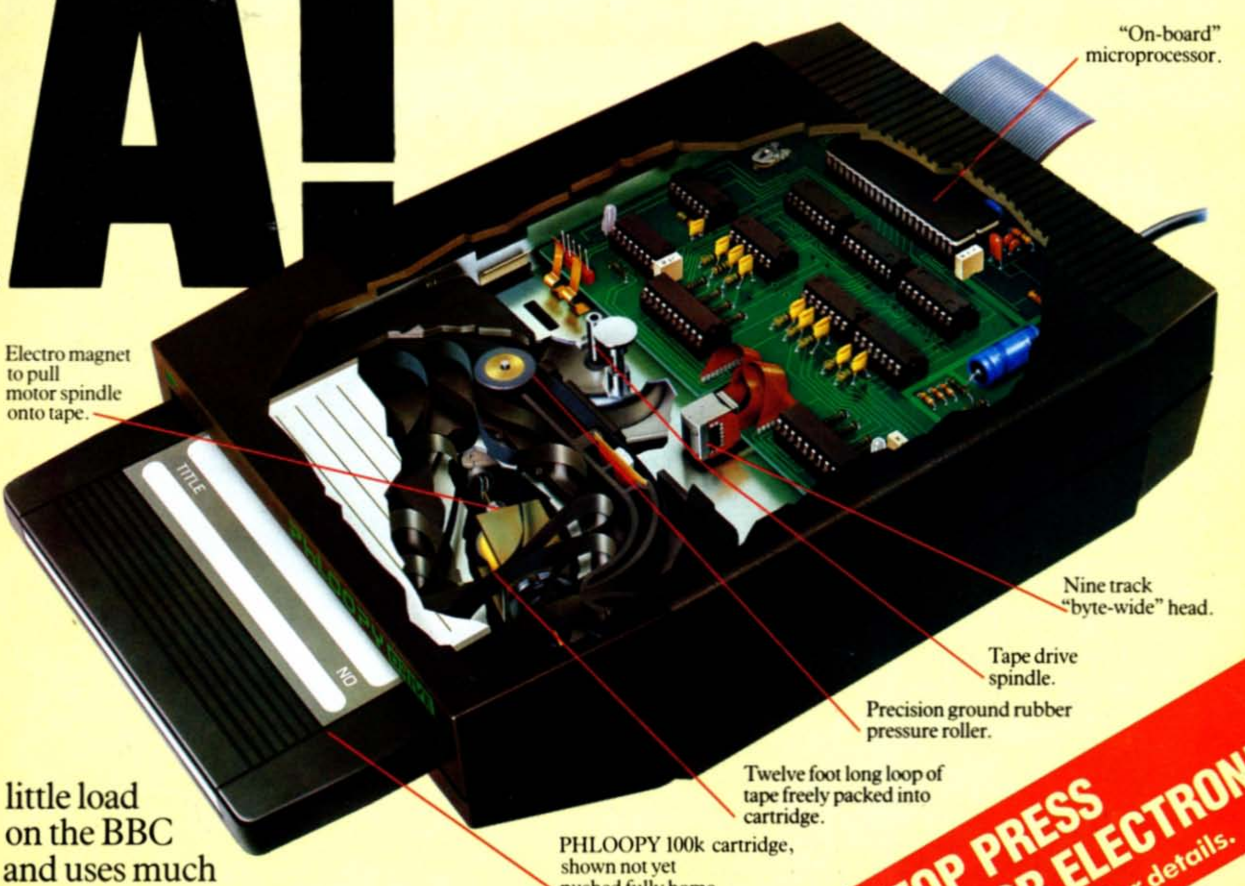
In addition, we've included a feature we know you will appreciate. PHLOOPY has full error detection and correction, so you can be certain you will get back what was originally written onto the tape.

Talking to your PHLOOPY

PHLOOPY's own software, contained in ROM, responds to standard BBC filing system and Basic commands. Most programs written to run on disk or cassette should run on PHLOOPY without problem.

And because PHLOOPY contains its own intelligent microprocessor – a second computer which does most of the hard work – PHLOOPY puts very

A!


"On-board" microprocessor.
Electro magnet to pull motor spindle onto tape.
TITLE
NO
PHLOOPY
Nine track "byte-wide" head.
Tape drive spindle.
Precision ground rubber pressure roller.
Twelve foot long loop of tape freely packed into cartridge.
PHLOOPY 100k cartridge, shown not yet pushed fully home.

little load on the BBC and uses much less RAM than most disk systems.

STOP PRESS PHLOOPIES FOR ELECTRON!
Send coupon or phone for details.

Installing PHLOOPY on your BBC

You'll be amazed how simple it is to install PHLOOPY. Just plug in the interface cut two resistors (clearly marked in the instructions) and the job is done. If you should have problems our engineers are waiting to help you.

Making a PHLOOPY Library

PHLOOPY cartridges hold a full 100k of data or programs. Two of them come free with the drive and extra ones cost £3.75 each plus VAT. They are moulded of high impact polymers for protection and store easily on a bookshelf. Many programs will be available to purchase on PHLOOPY.

Order Form

- Please send me further details about the PHLOOPY 100k data storage system for the BBC Model B.
- Please send me________(qty) PHLOOPY starter pack(s) for my BBC Model B microcomputer, including PHLOOPY drive, BBC interface, leads, connections, operating system in firmware, manual, and two PHLOOPY 100k cartridges, at £147.75 each including VAT, postage and packing. Amount £________
- Please send me______(qty) packs of 5 PHLOOPY cartridges at £19.75 including VAT, postage and packing. Amount £______

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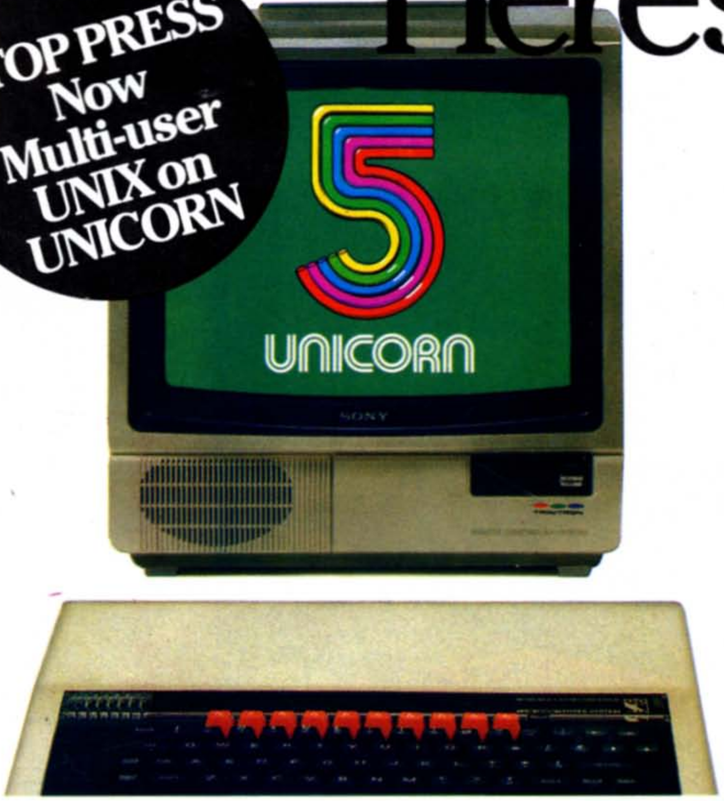

The ZEP 100

- **Z80 Extension Processor**
- **4MHz Z80A**
- **64K RAM**
- **24K ROM**

The object of any upgrade kit is to improve processing ability and to increase data storage capacity. The UNICORN ZEP100 is the first stage upgrade which opens channels into the world of serious computing.

The ZEP100 is the proven 8 bit second processor for the BBC Model B micro. A Z80 extension processor which enables the use of the well established CPN operating system, giving access to the vast range of applications programs and languages available for all CP/M® micros. When fitted to a BBC model B microcomputer with compatible high quality disc drives it provides a complete business or scientific computer which can run large applications programs or use advanced languages, with the ability to switch back to standard BBC programs at any time.

Any ZEP100 can be linked, via the Econet® option on the BBC, to a network of other TORCH computers to provide a workstation running on TORCHNET. Full TORCHNET operating systems software is provided to allow access to information anywhere on the network, or to communicate with other computers.

The 64K ZEP100 is supplied with full software support including word processing, spreadsheet, database and utilities. **The ZEP100 – around £299 (ex. VAT).**

The new UNICORN range from TORCH Computers gives the enthusiast and professional user a choice of upgrades which takes the BBC Model B Micro to the ultimate height of performance.

The result of TORCH'S total commitment to the BBC Micro is the only complete range of high performance hardware available. Offering every BBC Micro owner five new upgrade channels, UNICORN will transform your BBC into a fully communicating workstation, a CP/M® compatible business machine or the ultimate in high powered 32-bit data processing.

At the top of the range, THE UNICORN, offers the power and sophistication of System III UNIX® whilst other channels make available the flexibility of languages such as FORTRAN, PASCAL, BCPL and COBOL. All models, with the exception of the HDP240, provide BBCBASIC(Z80) on the Z80 rather than the Model B's 6502.

Tune in to the Channel that most suits your requirements. Whichever level you choose you can be sure of a system with infinitely expandable potential for a confident future in the world of computing.

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hannels for the BBC. programme.

The ZDP 240

- **4MHz Z80A ● 64K RAM**
- **24K ROM**
- **Twin, double sided 400K floppy discs**
- **Independent integral power supply**

TORCH Z80 DISC PACK

The UNICORN ZDP240 (Torch Z80 Disc Pack) is the proven upgrade for the BBC Model B microcomputer. Offering the use of more powerful and flexible languages such as Fortran, Pascal, BCPL and Cobol, it provides 800K of disc storage plus a Z80 second processor with 64K RAM running TORCH's own CP/M® compatible operating system based in ROM.

This advanced design means that almost all of the 64K RAM provided by the Z80 board is available for CP/M® programming use – an advantage no other BBC micro upgrade can offer.

If your BBC micro has the Econet® option, there is a further benefit the ZDP240 can offer. TORCHNET can link together up to 254 upgraded Model B's on a local area network, so for enthusiasts, Clubs and Schools it is a simple and low-cost way to achieve networking facilities.

The discs can be used for storage under the Acorn DFS system or for CP/M® programs and data.

A comprehensive software package is provided with the disc pack. It includes word and data processing and a spreadsheet program, along with utility programs and manuals.

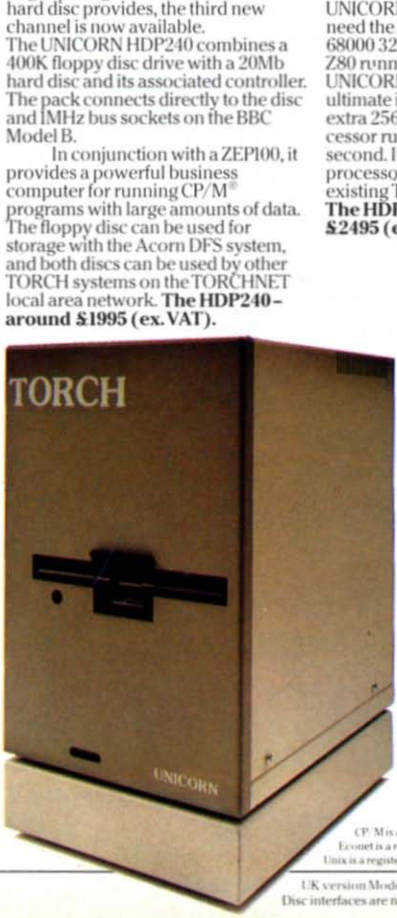
The TORCH Z80 Disc pack is recommended by the CCTA for government use. **The ZDP 240 – around £699 (ex. VAT).**

The HDP 240

- **20Mbyte hard disc Winchester**
- **Double sided 400K floppy disc**
- **Integral power supply**

For users who need much more storage capacity than is available on floppy discs and who require the large speed gains that a Winchester hard disc provides, the third new channel is now available.
The UNICORN HDP240 combines a 400K floppy disc drive with a 20Mb hard disc and its associated controller. The pack connects directly to the disc and 1MHz bus sockets on the BBC Model B.

In conjunction with a ZEP100, it provides a powerful business computer for running CP/M® programs with large amounts of data. The floppy disc can be used for storage with the Acorn DFS system, and both discs can be used by other TORCH systems on the TORCHNET local area network. **The HDP240 – around £1995 (ex. VAT).**



The HDP68K

- **8MHz MC68000 ● 6MHz Z80B**
- **256K RAM (68000)**
- **64K RAM (Z80)**
- **20 Mbyte hard disc Winchester**
- **Double sided 400K floppy disc**
- **Integral power supply**

The fourth channel in the UNICORN range is for users who need the extra processing power of a 68000 32 bit processor, as well as the Z80 running standard software. The UNICORN HDP68K provides the ultimate in performance, offering an extra 256K RAM and a 68000 processor running at 8 million cycles per second. It also contains a Z80 processor to allow the running of existing TORCH software.
The HDP68K – around £2495 (ex. VAT).

The Unicorn

Spec. as HDP68K PLUS UNIX® operating system. Single-user or Multi-user

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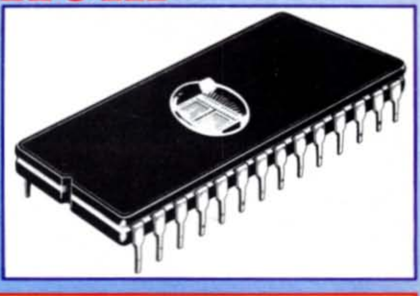
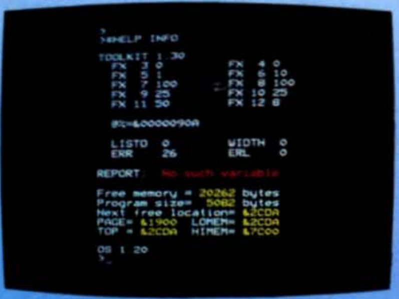
TOOLKIT ROM from BEEBUGSOFT

BASIC Programmer's Aid for the BBC micro





```
>
>*HELP INFO

TOOLKIT 1.30
   FX  3 0              FX  4 0
   FX  5 1              FX  6 10
   FX  7 100            FX  8 100
   FX  9 25             FX 10 25
   FX 11 50             FX 12 8

   @%=&0000090A

   LISTO  0         WIDTH  0
   ERR    26        ERL    0

REPORT:  No such variable

Free memory = 20262 bytes
Program size=  5082 bytes
Next free location= &2CDA
PAGE= &1900  LOMEM= &2CDA
TOP = &2CDA  HIMEM= &7C00

OS 1.20
>_
```

- **27 new commands to make life easier**
- **Saves hours in program development and debugging**
- **Supports both cassette and disc systems**
- **No command name conflict with other Roms**
- **Ideal for expert and novice alike**
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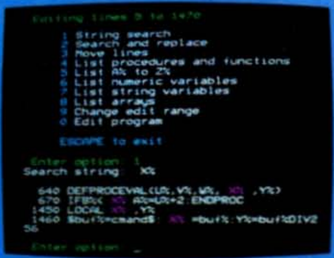
SPECIAL FEATURES INCLUDE

SCREEN EDITOR An extremely powerful editor, allowing the use of cursor keys to list a program line-by-line in either direction and move to any part of a program to overtype or insert new code and corrections.



```
Editing lines 5 to 1470

      1 String search
      2 Search and replace
      3 Move lines
      4 List procedures and functions
      5 List A% to Z%
      6 List numeric variables
      7 List string variables
      8 List arrays
      9 Change edit range
      0 Edit program

      ESCAPE to exit

 Enter option: 1
Search string:  X%

  640 DEFPROCEVAL(U%,V%,W%, X% ,Y%)
  670 IFB%< X% A%=U%+2:ENDPROC
 1450 LOCAL X% ,Y%
 1460 $buf%=cmand$: X% =buf%:Y%=buf%DIV2
56

 Enter option: _
```

ERROR DETECTION Powerful facility to trap an error in a Basic program as it runs. It will then automatically enter the Screen Editor, display the line in error and position the cursor close to the statement at fault.

> "TOOLKIT is an essential utility for all Basic programmers using the BBC Micro. . . .an indispensable aid packed full of powerful utilities."
> EDUCATIONAL COMPUTING MARCH 1984
>
> ". . . highly recommended,"
> PCN MARCH 17 1984

> "The Beebugsoft Toolkit costs £27 and in my opinion is worth every penny. Since it has been installed in my BBC it has been used extensively and I can find no fault with it. Highly recommended to lazy programmers!"
> COMPUTING TODAY JUNE 1984

COMMANDS

***CHECK**	Verify a program or data in memory with disc/cassette.
***CLEAR**	Clear all variables including integers.
***EDIT**	Enter full screen editor.
***FREE**	Display free memory and pseudo variables.
***HELP INFO**	Display a screenful of useful system information.
***MEMORY**	Display memory contents.
***MERGE**	Merge a program in memory with one on disc/cassette.
***MOVE**	Move program to run at specified address.
***NEW**	As NEW, but can be issued from within a program.
***OFF**	Cancel enhanced error handling.
***OLD**	As OLD, but can be issued from within a program.
***ON**	Auto error handling – enters editor at line in error.
***PACK**	Efficient program compactor.
***RECOVER**	Intelligently recover bad programs.
***RENUMBER**	Allow partial renumbering.
***REPORT**	Extended error reporting facility.
***SCREEN**	Screen dump to cassette or disc.
***UTIL**	Display utilities menu.
***UTIL 1**	String search.
***UTIL 2**	String search and replace.
***UTIL 3**	Move Basic program lines.
***UTIL 4**	List procedures and functions.
***UTIL 5**	List values of A% to Z%.
***UTIL 6**	List numeric variables.
***UTIL 7**	List string variables.
***UTIL 8**	List names of arrays.
***UTIL 9**	Set up range for utilities 1 and 2.

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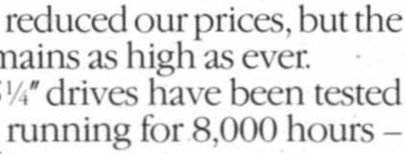

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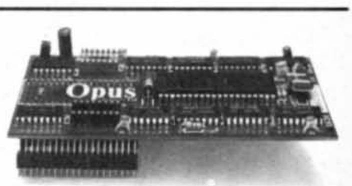

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High recommendation indeed from Personal Computer News. Meanwhile Acorn User said:

"It seems that all 'normal' and 'medium' resolution monitors, including the Sanyo, are simply inadequate to deal with the Beeb's graphics and text output . . . The JVC was excellent, giving clear, legible results . . . Was the JVC better than the Microvitec?* Would I buy one? Yes to both questions."

Our RGB high resolution colour monitor (580 × 470 pixels) sells for £229.95 (excluding VAT) – that's a saving of over £100 compared with other leading monitors of similar specifications.

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THE MICRO USER
NOVEMBER 1984

NEWS

PIRATES FORCE A&F OUT OF BBC MARKET

PIRACY of its products on a massive scale has forced leading software house A&F to abandon in-house development of games for the BBC Micro.

The firm's managing director, Mike Fitzgerald, described the decision as "regrettable in that the BBC is such a fine machine, bug unavoidable in view of the financial situation".

Fitzgerald told *The Micro User* he agonised for three months before deciding that Snarl-Up – companion to the best-selling Chuckie Egg and Cylon Attack – would be the last in-house game produced by A&F for the BBC Micro.

"It was a sad decision to take", Fitzgerald said, "but the pirates are so highly organised on such a massive commercial basis, we really had no choice.

Tightrope

"It costs us £35,000 to develop and market a new program and we need to sell 22,000 copies to break even. Wholesale piracy is cutting into sales to such an extent we're walking a financial tightrope.

"We just can't protect our BBC games completely enough against the powerful equipment pirates can buy over the counter these days and use to get into our tapes.

"I'm not talking about kids who get together to run off a few copies – that doesn't worry me particularly.

Hurting

"It's the big boys who are producing cassettes with up to 30 games on them who are really hurting us.

Fitzgerald warns that other software houses could follow A&F's lead.

A&F hasn't abandoned the BBC Micro completely. Fitzgerald will continue to publish other people's programs on the A&F label.

"But our future in-house development will concentrate on the Spectrum and Commodore, with projected heavy support for the MSX and Amstrad systems", he said.

It's the log-on show

THE big talking point in the computer world today is communications. And that's also the theme of the Electron and BBC Micro User Show at Alexandra Palace from October 25-28.

The availability of low cost, high quality communications packages – such as the one offered in this month's edition of *The Micro User* (see Page 210) brings this fascinating subject within the reach of every BBC Micro user.

Control

At the show Pace Electronics is showing how a schoolteacher can maintain control of a classroom full of pupils by means of its E-net networking system.

Micronet, the electronic magazine for the micro owner is also being demonstrated in depth.

And there will be demonstrations of how the exchange of data files between individual users avoids the tedium of hours of keyboard bashing.

Spanning

Communications is a truly international topic and the show is spanning the Atlantic to talk to computers in the US.

Knowledge Index is demonstrating how intelligent systems can answer a wide range of queries even at a distance of several thousand miles.

Acorn expects bumper Xmas

WITH sales of the BBC Micro now edging towards the magical half million mark, Acorn is forecasting bumper Christmas sales for its dealers – and all the other firms making BBC Micro add-ons.

Chairman Hermann Hauser, presenting the company's annual report, said sales of the BBC Micro topped 220,000 in the last year – making a total of 370,000 since it was launched.

In the last year, too, 90,000 Electrons have been sold.

Said Hermann: "The company has grown spectacularly. In the last year we have become the largest British micro company by sales".

In the last year sales more than doubled, from £42.4 million to £93.2 million.

But such a go-go performance was not matched by profits, which limped up from £8.6 million to a miserable £10.8 million. The City showed its disappointment, with the share price dropping 11p to 107p – or 13p below last October's tender price.

Financial pundits had been forecasting profits of at least £15 million, so what had gone wrong?

Hermann Hauser admits that Acorn's attempt to crack the £700 million market in the USA had proved "much more difficult than we anticipated".

However a rescue operation is now under way. But Acorn is cautious about making rash forecasts.

All Hermann Hauser is prepared to say is that the company expects "to reach profitability within the accepted timescale".

Back home, he sees Acorn's main growth to come from the sale of "various upgrade and expansion facilities" for the large number of BBC Micros and Electrons now in use.

And he hints that plans are under way to enter the telecommunications field.

MINI OFFICE BOOM

MINI Office, the revolutionary package from Database Publications that turns the BBC Micro into an inexpensive office tool, is selling as fast as it can be produced.

The professionally written word processor, database, spreadsheet and graphics package costs only £5.95 on tape and £7.95 on disc.

"We're working flat out to keep up with the demand", says Database joint managing director Derek Meakin.

Crazy

"At the PCW Show we had people from other software houses coming up to us saying we were crazy to sell it at such a low price. Many said it ought to be at least £15.

"But it was a deliberate decision to keep the price down and go for volume sales – and events have proved us right.

"The only snag is that some people feel that for £5.95 they cannot be serious programs. So we had a printer on our stand churning out business letters and graphs – and that soon convinced them!"

Young masters make their move

PRIMARY schoolchildren throughout the UK are competing in "Make Your Move", the first-ever computerised chess championship.

It is being sponsored by Acorn and the BBC's teletext service, Ceefax.

In the final stages contestants will compete from their own schools using BBC Micros with chess software and linked by phone line to the Ceefax computer in London.

Contestants' moves will be displayed on Ceefax pages, allowing the games to be viewed by chess enthusiasts throughout the country.

A knockout five round British Chess Federation random Swiss system tournament will produce eight regional winners for the national finals in January.

First prize for the winner's school is a BBC Micro with monitor, cassette recorder and teletext adapter.

The runner-up will receive a BBC Micro for the school and the remaining six finalists will get a teletext adapter or cash equivalent.

All finalists will receive an engraved chess clock.

Playing chess on a BBC Micro is eight-year-old Simon Huth from Brighton – watched by international chess master William Hartston

BAR CODE READER FOR SCHOOLS

MEP, the micros in schools project, has designed an educational bar code reader pack for the BBC Micro. It is being distributed by educational publisher Addison Wesley.

They say it will suit information technology students of all levels from primary school onwards.

The aim is to show students how bar codes act as a quick, foolproof way to input data, key words – even music – and to give an introduction to character recognition.

Starting with such exercises as reading the codes on packaged goods from the local supermarket, the student is introduced to an eight bar code where thick and thin lines represent the binary digits 0 and 1, giving a range of 255 Ascii characters.

Also dealt with is Telepen code, which uses different thicknesses of lines and spaces to condense program listings to a fraction of their usual length. Software is also included which will produce bar codes on most printers. This even applies to daisywheels, where the lower case *i* is repeated to form the bars.

The bar code reader can also be used as a simple digitiser, enabling scanned pictures to be reproduced on screen.

The pack comprises a reader with software on disc or cassette, a teachers' guide, plus a stencil for drawing bar codes by hand.

Available soon will be applications programs for library administration, multiple-choice exam marking and stock control.

British Telecom launches Firebird

BRITISH Telecom has entered the software market with 20 new games – four of them for the BBC Micro – under the Firebird label.

Despite being priced at only £2.50 each, the games are said by BT to be "the same quality as some products costing twice as much".

The first releases are all games, but educational software and other types of programs will be produced at a later date as will a series of "premium-range programs", according to a company spokesman.

Music package

NEW software house Island Logic has released its first product – a complete music package for the BBC Micro.

Music System is a co-development with System, the software firm that produced Music Editor for the BBC Micro last year.

First of a projected range aimed at the growing disc market, the system incorporates five distinct elements – editor, keyboard, linker, printer and synthesiser.

Designing micro

A NEW computer aided design system for the BBC Micro has been announced by Ibbotsons Design Software.

It is claimed to provide easy generation of circles, arcs, ellipses, hatching, repetition and the ability to build libraries of elements.

Drawings are created on screen with single keystroke commands, stored on disc and printed on a dot matrix printer.

Also available is a 3-D generator for making perpective views.

Woodn't you just believe it...

THIS is a story about a company lumbered with a boring boring problem that a BBC Micro whittled down to size.

Rackmaster of Salisbury makes wooden plate racks for stores like Harrods where the upper branches of society do their shopping.

So quality has to be top notch or the fir begins to fly in the workshop.

The knotty problem was finding people who could operate a drill precisely hour after boring hour without it going against the grain.

With over 200 cavities in the larger racks, workers were finding the whole thing extremely repetitive and tiresome and accuracy tended to suffer.

Enter the Small Firms Service of the Department of Trade and Industry. With their help, the firm's owner, Mike Holder, designed and built a machine that drills all the holes automatically.

Pieces of wood are simply loaded into a hopper and the drilling is activated from the BBC Micro keyboard.

The program copes easily with different lengths of wood that need different numbers of holes.

"We built the system round the BBC Micro because it was one of the most flexible low priced computers suitable for the job", says Holder.

A recent order for Macy's department store in New York involved drilling 27,000 holes in a few days.

"It would have been a daunting task to do by hand, but now it is just a minor part of the hole job", quipped Holder.

The system has been so successful that Holder is developing the idea for use by other firms with repetitive work.

Success on a plate, as they say at Rackmaster.

BBC MICRO JOINS IN OPERATION RALEIGH

THE intrepid BBC Micro is set to venture where no computer has been before – the exotic locations of three projects planned for the Operation Raleigh round-the-world expedition.

The machines will be helping young explorers study Costa Rica's rain forest, survey flooded caves in the Bahamas and analyse crocodile populations in Honduras.

A satellite-linked computing laboratory donated by Acorn Computers will be on board the Sir Walter Raleigh expedition flagship when it leaves the UK on November 13.

The lab is equipped with 11 BBC Micro systems, of which seven will be used in the field while the others will play a key role in ship administration and in the analysis of research data from projects carried out on board ship and in the field.

Computers on the ship will be linked by satellite to micros at Leeds University.

Teams in London, Hull and Leeds will be using other BBC machines to coordinate planning and help organise research groups in the field.

Operation Raleigh, the biggest multi-national expedition ever undertaken, aims to presents youngsters from all walks of life with challenges and hardships designed to pay off in terms of character-building and scientific discovery.

Dr Stephen Sutton (right), director of research for Operation Raleigh, in the Acorn computing laboratory on board the Sir Walter Raleigh.

More business software packs

ONE of Britain's leading business software houses has shown its faith in the future of the BBC Micro as a machine suitable for use in small businesses.

Systematics International has launched two programmes initially.

Sales and Purchase Ledger Duo controls cashflow by providing a record of ingoings and outgoings, keeping accounts up-to-date and issuing statements and reports. It automatically produces VAT statistics for returns and year end accounts for auditing.

Stock Control and Invoicing Duo monitors and automatically adjusts stock levels, while issuing purchasing recommendations.

The duos cost £89 each.

Systematics International marketing manager Brian Reynolds said: "We started writing business software for the most popular micros in 1980. First Apple, then the ACT range and IBM.

"But the obvious popularity of the BBC Micro with the general public in the UK has now made us decide to provide software for this machine as well – to enable even the small businessman to obtain the benefits of business computing".

Micro guide for disabled

A NEW edition of a guide to computers for the disabled has been published by Sunderland Polytechnic.

It includes details of products that enable disabled persons to use computers in cases where their disability prevents them using standard equipment.

Also included in the guide, price £8, are addresses from which details of educational software for the handicapped may be obtained.

The 240-page guide, first published in 1980, draws on sources in the UK, Europe and North America and describes special equipment for the blind and visually impaired, the speech and motor impaired, the physically handicapped, the mentally handicapped, and the hearing impaired.

It also contains a glossary of medical and computer terms, and addresses of computer-oriented educational and other specialist organisations.

Shop assistant is a micro...

THE BBC Micro is central to a new product designed to help shopkeepers to sell outside their normal trading hours.

The micro sits in the shop window 24 hours a day. Passers-by can ask it questions about the merchandise and see the answers on the screen.

They can also place orders when the shop is closed.

Operation is by a "touch-pad" stuck to the inside of the shop window and connected to the computer through a single lead.

Behind the idea is former school teacher and programmer Ron Binstead, 40, who has been inventing electronic gadgets since he was at school.

With his brother, who is doing a robotics doctorate at Brunel University, Binstead hopes to market the product in Britain and the US.

He says it is ideal for any business where the customer needs more details about what is on offer – estate agents, employment agencies and insurance brokers.

An estate agent could use a menu asking the customer to enter details of his required price range, location, number of bedrooms. The micro would then reply with a list of suitable houses.

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After-hours shopping by a finger on the window

Indonesia picks BBC

THE Indonesian Ministry of Education is on a buying spree in the UK. Included on its shopping list are BBC Micros, Cumana disc drives and Microvitec colour monitors.

Turtle on the air

A GRAPHICS turtle, invented at MIT and further developed at Edinburgh University, is now available in a radio-controlled version for the BBC Micro.

John Jessop, who builds the turtle at his London factory, has just perfected the radio model. He says the older, tethered turtles will convert from umbilical cord to remote control.

Fans of radio control claim that rival turtles controlled by infra-red beams don't perform so well.

But manufacturers of infra-red turtles claim the radio controlled ones suffer from interference from passing mini cabs.

A full LOGO for the BBC model "B" from Logotron.

LOGO is a computer programming language, which appeals equally to children in primary school or to computer scientists at the Massachussets Institute of Technology. Using LOGO, you unconsciously absorb advanced mathematical ideas and fundamental principles of computer programming. LOGO has been available on microcomputers only since 1982. Only this year has it been made available on British home computers like the Sinclair Spectrum and the BBC Micro.

LEONARDO WOULD HAVE LOVED IT!

Leonardo da Vinci would have loved it because LOGO gives full rein to a child's creative imagination, using visual images to convey profound ideas. LOGO could do for computers what perspective did for pictures, bring them alive.

Logotron's LOGO for the BBC "B" was written by LCSI/SOLI, the software house responsible for LOGO implementations for Atari, Apple, IBM, Sinclair, Coleco, and NEC. It's the closest there is to an international LOGO standard, with turtle graphics and full list processing. The software is contained on a single 16k ROM, written in 6502 machine code, fully compatible with the 6502 second processor unit and Econet. Facilities are provided to drive floor turtles, create and use data files, and access routines written in machine language. Full access is provided to the BBC micro's operating system. An optional sprite board, also provided by Logotron, can be used to handle video output and provides more than 30 programmable sprites, allowing true animation.

LOGO
BBC 'B'
SOFTWARE BY LCSI/SOLI
LOGO
LOGOTRON

Please send me further information concerning Logotron's LOGO for the BBC Model "B".

NAME ....

ADDRESS ....

.... ☐ Educational Establishment;

☐ Home user; ☐ Dealer*; ☐ Distributor* *attach to company letterhead

If you want to know more about LOGO, send for a descriptive leaflet and price list.

To: Logotron, Dept.MU3, 5 Granby Street,
Loughborough, Leicestershire LE11 3DU,
England.

LOGOTRON

Micros move into the kitchen

LIKE many other software houses, Shumwari Associates are concerned about the lack of female enthusiasm for computers.

Their aim, they say, is to take women out of the kitchen and place them in front of keyboards.

So they have produced a sophisticated program for female BBC Micro users that will entice them . . . right back into the kitchen.

Comp-u-Cater is a disc based menu planner and recipe file.

It can plan a menu from the recipe file, provide printouts for the table, the kitchen and the shops, and allows the user to amend and create recipes.

There are 228 recipe cells in the program divided into five categories – starters, main dishes, vegetables, accompaniments such as salads and desserts.

These subdivide by means of menu choice option screens until the desired recipe is reached.

After receiving the printout, all the user has to do is buy the ingredients and cook them.

Shumwari hasn't yet come up with a program that will perform these tasks.

Maths aid

HELPING children get a grasp of maths, literacy and logic are three educational programs for the BBC Micro developed by Applied Systems Knowledge.

Like all ASK programs, the new titles "Podd", "Squeeze" and "Juggle Puzzle" have been written by practising teachers working with professional programmers, and are designed to make learning fun.

They cost £9.95 or £11.50 on disc.

Richard, 8, sets family on road to fame

WHEN the Hollis family of Frome, Somerset, bought their BBC Micro last year they encountered a slight problem.

While his parents and older brother enjoyed their new world of adventure games, eight-year-old Richard Hollis found it all a bit of a turn-off.

He was desperately keen to play, but found the text-dominated programs difficult to follow.

So his mother, Kristin, and brother Martin, aged 12, decided to write a game Richard could cope with on his own.

That first attempt at program writing led to further bursts of creative activity from the Hollis household, and eventually to publication in leading computer magazines including *The Micro User*.

Now the mother-and-son team has come up with an adventure game for five to nine-year-olds that is being marketed on cassette by Database Publications.

Called The Magic Sword, it allows youngsters to explore a fairy tale world peopled by familiar story book characters and sprinkled with magic.

Its colourful animated graphics and exciting sound effects encourage the player to travel through the countryside, explore a castle with secret passages and dungeons and rescue a beautiful princess from the clutches of a witch.

A special bonus for buyers of the £8.95 cassette is a free 48 page full colour book that recounts all the events leading up to the start of the adventure.

Kristin Hollis wrote the book with help from Martin, who drew the illustrations. Martin devised the game program based on his mother's design and graphics.

Now the pair are hoping to have more games published on cassette.

Kristin Hollis said: "Now we are hoping for further success. We have written a nursery-land game for children aged four to seven and are working on one based on a traditional fairy story which will appeal to the seven to nine age group".

● ***In our picture authors Kristin and Martin Hollis watch Richard test The Magic Sword.***

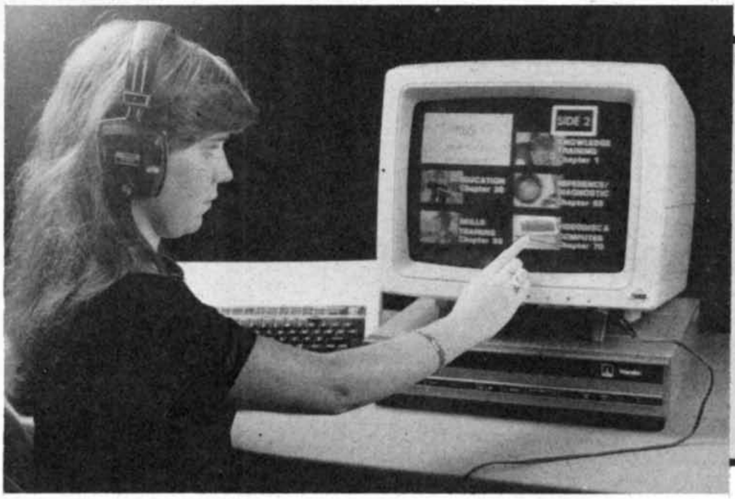
Zapped out!

YORK schoolboy Owen Coates, 14, is claiming a world record for playing video games after a non-stop alien zapping stint in Leeds. "I kept nodding off a bit, but my fingers were still going on the buttons", the youngster said after clocking up 51 hours 21 minutes at the controls of his BBC Micro.

Owen was attempting to beat the previous record of 23 hours 10 minutes when he heard that another challenger playing at the same time in Bridlington had reached 50 hours.

So the plucky youngster gritted his teeth, flexed his fingers and – with support from sister Michaela who kept dousing him with cold water – zapped on for another 28 hours.

When it was all over, Owen slept for 12 hours then enjoyed his reward – a meal paid for by Michaela.



BBC gets a touch screen

A TOUCH screen display which interfaces with the Thorn EMI VHD videodisc player and the BBC Micro has been introduced by Cameron Communications.

Interact B allows the user to control the disc player by touching the screen. Colour text and graphics from the BBC Micro are superimposed on the video image to generate touch menus.

Interact B will be available this year for system developers and pilot videodisc projects. Volume shipments are planned for January.

Family snaps can go on disc

INSTEAD of pasting treasured photographs in the family album, why not store them on disc or cassette?

BBC Micro owners can now do this, after a fashion, with the help of a video digitiser from R.H. Electronics.

At £250 it isn't the cheapest way of preserving snapshots. Nor is the resolution as good as you might prefer.

But RHE project coordinator Graham Tibbet sees the new machine being of great use to graphic artists and software program writers.

Applications

Other applications are emerging in the fields of engineering and medicine.

Kings College Hospital, London, is using a video digitiser with a spectrum analyser for measuring blood flow in pregnant women.

And a North of England engineering company is using the equipment to calibrate fuel gauges at a reported saving of £35,000.

Tibbet says a machine with image analysis capabilities is "only a few weeks away". This will further increase the value of the digitiser to science and industry.

ACORN MAKES IT EASY AS ABC

ACORN researchers say they have identified four slots in the computer market which they intend to fill with the recently unveiled ABC range of business micros.

All are based on the BBC Micro, with a choice of second processor addons. There are eight models in the range.

The basic 32k machine features Econet, plus instant word processing and spreadsheet from two programs in permanent memory. It has one 640k floppy disc and 12in black and white screen.

Next model up the range has an extra floppy disc and a Z80 second processor running CP/M. An enhanced version has a 10mbyte Winchester replacing one of the floppies, plus a colour monitor.

Two "academic" models are aimed at universities, R & D departments and the like. They have 16/32 bit processors and 256k RAM as standard.

As before, there is a choice of a Winchester-equipped version with colour monitor, and this model will run the Unix operating system. Languages offered include C and Pascal.

Finally the top-of-the-range Executive workstations offer IBM compatibility and multitasking.

An Intel 80286 chip runs Digital Research's Concurrent operating system and supports applications written for PC/DOS, MS/DOS and CP/M 86.

The 256k RAM can be upgraded to 1mbyte. As before, there are two versions, one with twin floppies and b/w screen and the other with one floppy replaced by a 10mbyte Winchester and colour screen.

Next year Acorn plans to bring out a mouse for the two executive models.

New medical role for micro

NEW roles for the BBC Micro in medical and industrial research and analysis are opened up by the new Video Interface Peripheral from Sight Systems.

Priced under £3,000 the VIP is a tool for universities and research establishments contemplating using BBC Micros in an image analysis or image processing application.

The machine stores grey and binary images for further processing and analysis by the computer. By selecting upper and lower threshold (grey) levels, the grey store is segmented and the accepted regions are converted to peak white and written into a binary store.

By providing a separate video rate binary image store, the user can isolate features of interest for analysis, counting and area type measurements.

Switch

The frame store images can be displayed on the monitor at full resolution (2 to 8 bits) and only one monitor is required as the VIP can switch between computer text and video from the output DAC, which displays contents of the binary and grey level stores.

Graphs on tap

MICRO users taking O and A levels can now study the graph and equation side of mathematics with a package called Graph-Easy.

According to its Norwich-based publisher, Hama Systems, the package can also be used to solve high-level engineering, scientific and business problems.

It comes on disc or cassette complete with a manual containing exercises and assessment questions for students at all levels from newcomers to post-graduates.

MAKE A MILLION

INCENTIVE Software has released Millionaire, a simulation of running a software company. Versions are available for the BBC and Electron on one double sided cassette.

It includes graphics of your house, which increases in size as your profits grow.

Players start with £500 to market a program. By careful marketing and maybe the odd dodgy deal with Honest Harry you can move from humble beginnings to a millionaire's estate.

But beware – such a deal could put you on the wrong side of the law!

QUALITY NEVER LOOKED SO GOOD–

Now everyone with a BBC or IBM PC will want to get their paws on CUB's sleek new D series plastic cabinet – a triumph of ergonomics and up to the minute design. Within it is the CUB 653 MEDIUM RESOLUTION colour monitor – the perfect mate for computer users who wish to combine the advantages of brilliant, low cost colour graphics with 80 column processing software.

CUB 653's remarkable depth of colour is enhanced by minimal screen glare, thanks to a super high contrast CRT. Even in well lit environments the 653 (H) × 585 (V) resolution and 0.43mm dot pitch produces 80 column text which is pin-sharp and easy to read. Owners of SHARP, RML 480Z, APPLE Series, WANG and other leading computers needn't feel left out, because CUB 653's compatibility extends to these models and many more.

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1984

Available from High Street Computer Retailers and selected branches of W. H. Smith, Harrods, John Lewis Partnership, John Menzies with selected models available from larger branches of Boots.

Your
Christmas Day
Program
Guide

Acornsoft announce tidings of great joy for both BBC Micro and Electron owners: eight brand new programs for Christmas.

Each one makes an ideal stocking filler.

They're all available at your local Acorn stockist. (To find out where that is, simply call 01-200 0200.) Or you can send off for our catalogue and order through the post by writing to Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Tel: 0933 79300.

Alternatively, however, you could always take a chance and drop a line to Father Christmas.

ACORNSOFT
Software for the BBC Micro and Electron.

9.00 Firebug

A fast moving arcade-type game in which you are a fireman, trying to rescue some oil drums and take them to the safety of a water tank. Your opponent is the firebug who runs around lighting fires which move slowly towards the drums and fire extinguishers, destroying them if contact is made.

10.00 Maze

A gripping graphics game where you enter a top secret installation with the aim of stealing secrets from a rival company. The security system, however, has many levels each consisting of a maze of corridors patrolled by armed robot guards. Complete with full colour 3-D graphics, sound effects and a high score table.

12.00 Elite

A superb 3-dimensional graphics game that's light years ahead of any other. You are a space trader who roams the universe, making your living from buying and selling cargo in your Cobra space craft. On your travels, you will encounter aggressors who are eager to put an end to your dealings. Be warned, only the fittest will survive.

1.00 Crazy Tracer

A crazy adventure in which you guide a paint roller round the edge of a maze of rectangles, while avoiding the monsters which are trying to stop you by crushing the roller. Beware – as the game progresses, so the number of monsters chasing you will increase.

3.00 Go

'Go' is a board game for two players which originated in China 3000 years ago and is now more popular than Chess in the Far East. It requires strategic insight, intuition and a strong, calculating mind. If you wish, you can also challenge the computer at differing degrees of difficulty. A velly good game indeed.

4.00 Watch Your Weight

At last, a weight-loss program designed especially for you. With it, your computer becomes an expert wholly conversant with and sympathetic to your needs, and will help you choose an appropriate and individual weight-loss plan. The program also includes a calorie counter and a series of apposite menu suggestions to help stimulate your imagination when you just can't think what to eat.

5.00 The Complete Cocktail Maker

With everything from a Black Russian to a Betsy Ross, this program contains data sufficient to concoct a staggering 320 different cocktails.

6.00 Paul Daniels' Magic Show

Stun and amaze your friends with your astounding feats of magic. This program contains ten tricks to be performed by or with your BBC Micro/Electron. Hurry though – it's bound to disappear fast.

MD 400
£155.65
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MD 800
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+ VAT = £359

MD 800P
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Part 19 of MIKE BIBBY's introduction to programming

DECISIONS, DECISIONS, ALL THE RND DECISIONS

AT last we've reached the stage where we can work on writing real programs. Have a look at Program I, it's fairly simple:

```
10 REM PROGRAM I
20 MODE 6
30 FOR loop% = 1 TO 10
40 PRINT RND(10)
50 NEXT loop%
```

Once you've got it typed in, run it through a couple of times and take careful note of the result.

Unless you're the kind of person who can continuously roll sixes with successive dice, the results should show significant differences.

This is because RND – which stands for random – generates a random number.

If you like, the micro electronically tosses a die – only you can pick how many faces the die has.

If you choose, say RND(5), the micro will throw a five-sided die and pick a number between one and five.

RND(10) on the other hand, will throw a 10 sided die, returning a number between 1 and 10. Notice we're talking about whole numbers – that is, integers. No fractions allowed.

We use the function RND where we want to bring an element of chance into computing or, as one cynic remarked, to make it more human.

Let's use RND's powers to create a decision taker. Look at Program II.

The idea is for the micro to choose randomly between five different decisions.

To do this we read the randomly chosen number between one and five, then use this number to index a string array containing the decisions.

Let's look at this in detail:

Lines 30 to 60 dimension the array *decision$()* and then read into it the decisions from the five data statements in lines 190 to 230.

Thus, *decision$(1)* would be: "Don't do it", *decision$(2)* would be "Oh, what the hell?" and so on.

The lines 70 to 170 contain the bulk of the program – a large REPEAT ... UNTIL loop allowing you to obtain multiple decisions from the micro.

Lines 80 and 90 clear the screen and urge you to press the space bar to make the decision.

Lines 100 to 120 hold the program up until the space bar – CHR$(32) – is pressed.

Line 130 does the hard work by randomly choosing *decision$()*.

When the micro encounters the RND(5) inside the brackets of *decision$()* it randomly picks a number between 1 and 5 and uses this as the subscript of *decision$()*.

The micro then prints out the selected *decision$()* at the correct TAB.

So although you know line 130 is going to print out one of the array *decision$()*, you don't know exactly which one.

If having that RND(5) inside the brackets is causing you a bit of bother, look at it this way. We can split line 130 over two lines by introducing *random%* a variable to hold our random number as follows:

```
130 random% = RND(5)
135 PRINT TAB(2,14) decision$(random%)
```

All we did in the original line 30 was to use RND(5) directly in place of *random%* – the micro doesn't mind at all.

Moving onto lines 140 to 170 the micro prompts for the space bar to continue, and uses the same loop as before to wait for it.

As soon as the space bar is pressed the micro encounters the UNTIL FALSE of line 180 and begins the main loop all over again. Easy, isn't it?

Notice, however, the give-away "same loop as before". If it is identical,

```
   10 REM PROGRAM II
   20 MODE 6
   30 DIM decision$(5)
   40 FOR loop%= 1 TO 5
   50 READ decision$(loop%)
   60 NEXT loop%
   70 REPEAT
   80 CLS
   90 PRINT TAB(2,12) "Press Space to
make your decision."
  100 REPEAT
  110 dummy$=GET$
  120 UNTIL dummy$=CHR$(32)
  130 PRINT TAB(2,14)
decision$(RND(5))
  140 PRINT TAB(2,16) "Press Space to
continue."
  150 REPEAT
  160 dummy$=GET$
  170 UNTIL dummy$=CHR$(32)
  180 UNTIL FALSE
  190 DATA "Don't do it."
  200 DATA "Oh, what the hell?"
  210 DATA "It's a very good idea."
  220 DATA "You'll be sorry if you
don't."
  230 DATA "You'll regret it if you
do."
```

From Page 35

why not put it in a procedure, called PROCwait_for_space?

If you look at Program III you'll see that's what I've done:

```
  10 REM PROGRAM III
  20 MODE 6
  30 DIM decision$(5)
  40 FOR loop%= 1 TO 5
  50 READ decision$(loop%)
  60 NEXT loop%
  70 REPEAT
  80 CLS
  90 PRINT TAB(2,12) "Press Space to
make your decision."
 100 PROCwait_for_space
 110 PRINT TAB(2,14)
decision$(RND(5))
 120 PRINT TAB(2,16) "Press Space to
cohtinue."
 130 PROCwait_for_space
 140 UNTIL FALSE
 150 REM ==========================
 160 DEF PROCwait_for_space
 170 REPEAT
 180 dummy$=GET$
 190 UNTIL dummy$=CHR$(32)
 200 ENDPROC
 210 REM ==========================
 220 DATA "Don't do it."
 230 DATA "Oh, what the hell?"
 240 DATA "It's a very good idea."
 250 DATA "You'll be sorry if you
don't."
 260 DATA "You'll regret it if you
do."
```

However, there's more we can do to make it more "procedural".

Initially we had to dimension *decision$()* and read the values in.

That's quite essential, but we could really do with hiding all that clutter away in a PROCinitialise. This will allow us to see far more easily what the main program is getting at – what programmers call its structure.

I've done this in Program IV. Have a look at it and I think you'll agree that it's far easier to read and make sense of than the original Program II.

So using procedures sensibly – we term it structuring – makes programs far easier to follow. And if they're easier to follow they're easier to debug – that is, sort out mistakes, later.

Mind you, we've gone about this in a back to front manner. We've written the program and then turned it into one with procedures.

```
  10 REM PROGRAM IV
  20 MODE 6
  30 PROCinitialise
  40 REPEAT
  50 CLS
  60 PRINT TAB(2,12) "Press Space to
make your decision."
  70 PROCwait_for_space
  80 PRINT TAB(2,14)
decision$(RND(5))
  90 PRINT TAB(2,16) "Press Space to
continue."
 100 PROCwait_for_space
 110 UNTIL FALSE
 120 REM ==========================
 130 DEF PROCinitialise
 140 DIM decision$(5)
 150 FOR loop%= 1 TO 5
 160 READ decision$(loop%)
 170 NEXT loop%
 180 VDU 23;8202;0;0;0;
 190 ENDPROC
 200 REM ==========================
 210 DEF PROCwait_for_space
 220 REPEAT
 230 dummy$=GET$
 240 UNTIL dummy$=CHR$(32)
 250 ENDPROC
 260 REM ==========================
 270 DATA "Don't do it."
 280 DATA "Oh, what the hell?"
 290 DATA "It's a very good idea."
 300 DATA "You'll be sorry if you
don't."
 310 DATA "You'll regret it if you
do."
```

It's much better to consider a program as consisting of separate building blocks or modules. If we plan our program in these terms we can then easily code these separate modules into procedures.

As an example, let's look at a program that throws a dice for us. It'll need three parts:

☐ You tell it to throw.
☐ It chooses the number thrown.
☐ It prints out the number.

Notice the three stages correspond to *input*, where it gets the word to throw from you, *processing*, where it does its computing, and *output*, where it tells you the results. Much of computing obeys this simple model.

Look at Program V. This contains the bare bones of the program: PROCinput, PROCchoose_die and PROCprint_out. And all three are in a REPEAT . . . UNTIL FALSE loop. It couldn't be simpler.

```
  10 REM PROGRAM V
  20 MODE 6
  30 REPEAT
  40 PROCinput
  50 PROCchoose_die
  60 PROCprint_out
  70 UNTIL FALSE
```

Don't try to run it, though – I haven't defined any procedures yet!

You could actually put dummy procedures in by adding the following:

```
  80 END
 100 DEF PROCinput
 199 ENDPROC
 200 DEF PROCchoose_die
 299 ENDPROC
 300 DEF PROCprint_out
 399 ENDPROC
```

You could then fill in the code line by line for each of the procedures separately and still be able to RUN the program to make sure each stage is working properly.

Program VI shows the finished product:

```
  10 REM PROGRAM VI
  20 MODE 6
  30 REPEAT
  40 PROCinput
  50 PROCchoose_die
  60 PROCprint_out
  70 UNTIL FALSE
  80 REM =============
  90 DEF PROCinput
 100 PRINT '"Press space bar to
throw"
 110 REPEAT
 120 dummy$=GET$
 130 UNTIL dummy$=CHR$(32)
 140 ENDPROC
 150 REM ============
 160 DEF PROCchoose_die
 170 die%=RND(6)
 180 ENDPROC
 190 REM ============
 200 DEF PROCprint_out
 210 PRINT '"You threw ";die%
 220 ENDPROC
```

PROCinput is virtually identical to

→

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ALL PROGRAMS FOR 32K BBC

AVIATOR

"Must be the most accurate and complete flight simulation for the BBC...the graphics are superb" (MicroUser). "This is an exceptional piece of work... you'll probably get more out of it than any other game you buy" (BigK). Keyboard or Stick. **(Acornsoft) CASSETTE £14.95 DISK £17.65**

DENIS

"A rapid-response, superbly complex game that is great fun to play" (PopCompWkly). "A delightful game...entertaining and challenging" (Crash). Text adventure Denis through the looking glass. **(Applications) £5.50**

FALL OF ROME

"Good graphics and fast response" (PCGames). "A lot of fun, especially if you succeed...an exciting challenge" (GamesComp). "A refreshing change...a gripping game...you won't want to leave it" (HomeCompWkly). **(ASP) £6.95**

FANTASIA DIAMOND

"A fantasy adventure that is both sophisticated and stimulating, and offers a great challenge" (PerCompNews). "A long adventure with many interesting and logical problems to solve. Highly recommended" (Crash). **(Hewson) £7.95**

FRAK

"This is a classic...one of the new wave of BBC games that are at last living up to the machine" (AcornUser). "Combines total originality with masterful programming...sets new standards for games on the Beeb...any games player should difinitely purchase this masterpiece of programming" (Beebug). NO STICK **(Aardvark) £8.90**

THE HULK

The style of 'THE HULK' reflects all of Scott Adams' famous adventures: the writing and the fast response get you hooked immediately. You will really enjoy this adventure, even if it is your first. Text only, but still very enjoyable. **(Adventure Int'l) £7.95**

SON OF BLAGGER

No longer a bank robber like his dad, this time Sone of Blagger is a spy. He's forced his way into the National Security HQ to search for the golden keys! Avoid the guards: watch out for the floor collapsing. Good graphics, 12 rooms, complete map on inlay card. *STIX:* Nome. **(Alligata) £7.95**

SAVE £££s ON ROMS

Computer Concepts ROMS have been widely praised - we use them all the time! And we sell them to you cheaper than anyone else we know! As Home Comp Wkly said "Installation is easy, providing you have a spare sideways ROM socket or an expansion board". **GRAPHICS ROM** "Good value for money...will provide anyone interested in graphics with a whole new field of possibilities" **(Beebug). £27.50 YOU SAVE £5.85. PRINTMASTER ROM** "If you have an Epson printer, there is no better choice at present than Printmaster" **(Beebug) £27.50 YOU SAVE £5.85.**

DISK DOCTOR "If you use discs or write assembler programs then you must have this chip **(HomeCompWkly) £27.50 YOU SAVE £5.85. WORDWISE** "Probably the most useful word processor on the market" **(YrComp) £36.00 YOU SAVE £10.00.**

CYLON ATTACK

"Excellent...the graphics leave most other games standing...sets a new standard for action games set in space" (MicroUser). "I have never seen a better thought-out and executed game" **(HomeCompWkly). STIX: OK. (A&F) £7.90**

FORTRESS

"An absolutely magnificent piece of programming. In many respects, the feel of the game is even better than that of Zaxxon" (PCGames). "The game is thrilling, the diagonally scrolling graphics superb and the sound effects excellent...in a class of its own" (MicroUser). STIX: OK.
(Pace) CASSETTE £8.95 DISK £11.95

OVERDRIVE

"The best race simulation I've seen on the Beeb, excellent value for money" (PersCompNews). "Graphics are good and the motor noises are most convincing...challenging enough to keep you at it" (YrComp). STIX: None **(Superior) £7.95**

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From Page 36

PROC_wait_for_space in Program IV. It just tells you to press the space bar when you want to throw.

PROCchoose_die picks a random integer between 1 and 6, and PROCprint_out prints it out.

Now you could argue that the last two procedures were a bit of a waste of time, since the active ingredients only consisted of one line apiece.

However the program is easy to follow written that way and there's another advantage – now we know we've got the main structure of our program up and running, we can add to it.

```
   10 REM PROGRAM VII
   20 MODE 6
   30 PROCinitialise
   40 REPEAT
   50 PROCinput
   60 PROCchoose_die
   70 PROCprint_out
   80 UNTIL FALSE
   90 REM =============
  100 DEF PROCinput
  110 PRINT '"Press space bar to
throw"
  120 REPEAT
  130 dummy$=GET$
  140 UNTIL dummy$=CHR$(32)
  150 ENDPROC
  160 REM ============
  170 DEF PROCchoose_die
  180 die%=RND(6)
  190 ENDPROC
  200 REM ============
  210 DEF PROCinitialise
  220 DIM line$(18)
  230 FOR loop%=1 TO 18
  240 READ line$(loop%)
  250 NEXT loop%
  260 ENDPROC
  270 REM ============
  280 DEF PROCprint_out
  290 PRINT '"You threw "'
  300 PRINT line$(die%*3-2)
  310 PRINT line$(die%*3-1), die%
  320 PRINT line$(die%*3)
  330 ENDPROC
  340 REM ============
  350 DATA "   "," * ","   "
  360 DATA "*  ","   ","  *"
  370 DATA "*  "," * ","  *"
  380 DATA "* *","   ","* *"
  390 DATA "* *"," * ","* *"
  400 DATA "***","***","***"
```

For instance, PROCprint_out is rather dull visually. After all, we're supposed to be throwing a die – why not print it on the screen?

Well, since we know the program works, we can begin to tinker with PROCprint_out confident of success.

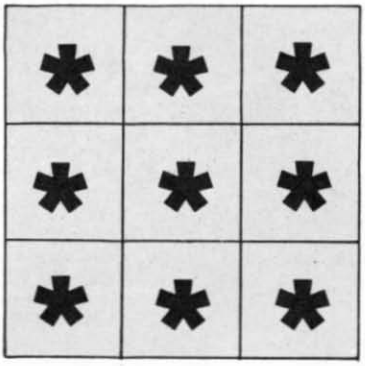
Program VII shows the outcome of this tinkering.

The main problems are how to draw the face that comes up, and how to pick the correct face to draw.

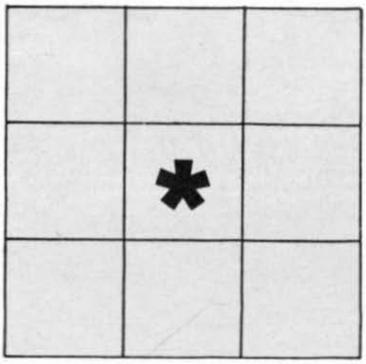
The eventual solutions I chose aren't the most elegant, but they do illustrate several of the things we've been covering lately.

Now each face of a die consists of three lines of information.

For example a six has three rows of three spots – I used asterisks – as in:



You could consider a one as having three rows – two of them blank and the middle one with a central asterisk:



All in all you'd need 18 lines – three for each face of the die.

If you look in the data statements at the end of the program – lines 350 to 400 – you'll find 18 strings, each three characters long, in sets of three.

Each set corresponds to one face of the die. Line 350 holds the three lines for a 1, line 360 the lines for 2 and so on.

In PROCinitialise we dimension *line$()* and read into it the 18 pieces of data.

This means that *line$(1)*, *line$(2)* and *line$(3)* hold the face data for a throw of one.

The following table relates the subscripts of *line$()* to the face values:

line$()	***face***
1,2,3	**1**
4,5,6	**2**
7,8,9	**3**
10,11,12	**4**
13,14,15	**5**
16,17,18	**6**

So, to produce a 4 on the screen we would print *line$(10)* followed by *line$(11)* then *line$(12)*, one under the other.

The second problem now becomes how to select the correct three values of *line$()* corresponding to the face selected in PROCchoose_die – held in the variable *die%*.

Lines 300 to 320 in PROCprint_out accomplish this. This may look a bit complex at first, but if you try various values of *die%* in the lines you'll see that the correct face is printed.

For instance, if *die%* had the value 1, the lines in question would boil down to:

```
300 PRINT line$(1)
310 PRINT line$(2), die%
320 PRINT line$(3)
```

Which is the correct face.

Try it for other values of *die%* and you'll soon get a feel of how it works.

Incidentally, the *die%* tagged onto the end of line 310 is just so we print out the figure as well as the face.

Don't worry if it takes a while to work it all out – this is the most complex piece of programming we've done.

Notice that PROCinput and PROCchoose_die, our tried and trusted procedures from Program VI, remain unchanged.

Well, that's enough for this month – as I'm sure you'll agree!

Next month we'll use our growing programming prowess to explore other useful Basic techniques.

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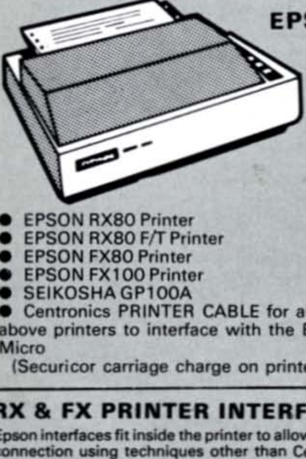

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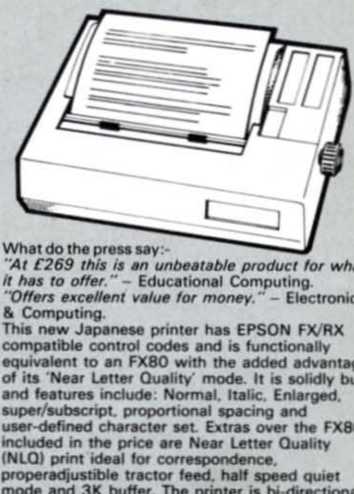
KAGA KP810



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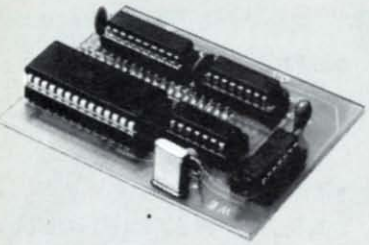

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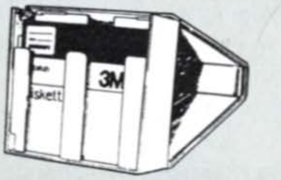

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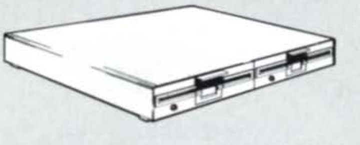

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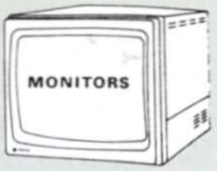

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The system consists of a mother board which fits inside the BBC and further daughter cards can be connected externally. The internal card has the following features:

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- There is very little extra current drain, even with a fully loaded board as only the presently active ROM is powered up. In fact the fully populated board uses only 300mA.
- The board reduces micro bus loading by up to three ROM loads, which improves reliability and performance.
- Installation is extremely simple. There is no soldering required. The board is rigidly held by two 40 pin sockets and five support posts. A ribbon cable can be brought outside the computer and up to 8 external cards added. This enables the user to plug-in up to 142 paged ROMs. The cards have following features:
- Each card can accommodate up to 16 devices each of which can be configured as 2716, 2732, 2764, 27128 ROMs or 6264 8K RAMs.
- Battery backup is provided from the internal card.
- Only the active ROM is powered up permitting many external ROMs to be added with very little current loading (100mA per card).

The system comes with controlling software in ROM. The utilities supplied are as follows:

★ APEX – replies with the device number currently being accessed.

★ APEX C – toggles between the colour and standard black and white messages.

★ AL – loads from any device, regardless of the data type.

★ AS – saves memory to any specified RAM device.

★ AD – prints a directory of the devices present in the system, i.e. ROMs present and files stored. This also reports on the amount of free storage space.

★ AF – asks for the free RAM devices.

★ LA – repeats the last command to paged ROMs.

Continued

★ AT – enters a memory testing routine. This will write a test pattern into the memory and read it back out again. If a fault is found, it is reported to the user. This test continues until Escape is pressed.

- RDISC – activates APEX as a filing system which then treats all free APEX RAM in the system as a continuous 'RAM-DISC'. All commands have similar format to the DFS and transfer is possible between the two systems.

The complete computer system bus is available to the user, so that other cards/devices coulu be added such as EPROM programmers, second processors, Winchester disc drives, clocks, etc. By racking the cards you eliminate the tangled mass of cables that usually accumulates around the micro.

A comprehensive operating manual is supplied with every APEX Board. Please write in for further details and prices.

THE ULTIMATE DFS FOR BBC MICRO

by

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Highly acclaimed at The ACORN and BBC MICRO USER Shows. What do the independent press say?

Good value for money – *Beebug Aug. '83*

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EPROMs & CMOS RAMs

NEW LOW PRICES

2764-250nS (8K ROM)	**£5.25**
27128-250nS (16K ROM)	**£19**
6116-150nS (2K RAM Low Power)	**£5.25**
6264-150nS (8K RAM Low Power)	**£28**

Continued →

BEEB PRINTER ROM

"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

- Selection of printer modes such as underline, font and size is by 'Single Key' operations.
- From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
- When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
- User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
- Commands select the options for the following printers: GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.

Operates with either parallel or serial interfaces.

- Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro.

It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!

The ROM also provides window setting facilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. Two commands are used to operate the dump routines:

*GIMAGE – This provides a full graphics dump of any Mode (including Mode 8). There are various optional parameters but you need only specify the parameters you wish to change.

- V <scale>, H <scale> – These 2 byte numers give fine control over the size of the dump from minute to enormous. Unlike other dump ROMs the scale does not change with mode.
- R <0-3> – Print dump rotated by 0.90, 180, 270 degrees.
- I <indent> – Set gap from left edge of paper.
- X <min>,<max>, Y <min>,<max> – The whole of the screen graphics window area is dumped except when these parameters are given.
- P – Physical colour values are used for plotting, otherwise a negative scale is used (white darkest).
- T Two tone dump for maximum resolution.
- M <mask> – 8 bit colour mask.
- E – Contrast expansion to make mode 7 text and separated graphics stand out from the background.
- C – All mode 7 graphics are printed as contiguous to improve the shading in graphic areas.

*TIMAGE <indent> – Does a fast, text only, dump of the contents of the text window in any mode.

*GWINDOW and *TWINDOW – These commands draw the graphics and text windows, respectively, on the screen and allow them to be changed with the cursor keys. N.B. GIMAGE and GWINDOW work fully in mode 7.

Designed for use with the following printers: CP80, GP80, GP100, GP250, STAR, KAGA/TAXAN, NEC, SHINWA, GEMINI, EPSON MX/RX/FX,LPVII, DMP 100/120/200/400, CANON.

Price including comprehensive manual **£22**

APPROVED for use
with telecommunication systems
run by British Telecommunications
in accordance with the conditions
in the instructions for use.

MODEM 84

PRESTEL TERMINAL

For the BBC Microcomputer

COMMUNICATION
WATFORD ELECTRONICS GIVES YOU
"THE KEY TO WORLD COMMUNICATION"

The Watford Prestel package allows B.T. approved connection to Prestel, Micronet and many other 1200/75 baud databases for about the cost of a good tape recorder.

Prestel gives you access to an incomparable database covering almost every subject under the sun. There is Micronet with lots of free programs that you can download and run. Details of clubs and user groups, a diary of meetings and exhibitions, news and reviews, technical information etc. There is Homelink with online banking. And there is armchair shopping, travel information, entertainment, world news, sports news, weather information, electronic mail and lots more.

The basic Prestel subscription is only £5 per quarter and at off peak times there is no charge for access time. A local phone call facility means no long distance phone calls to Prestel (approx. phone cost is only 40p per hour).

The Watford Prestel package consists of the B.T. approved Watford MODEM 84 (1200/75 baud full duplex 1200 baud half duplex direct connect) and a very sophisticated Prestel Terminal ROM.

This totally machine code software:

- is fully compatible with not only the Modem 84 but also with the PRISM 1000 and most other modems that require a data link via an RS423/RS232 port making it a worthwhile purchase for those who already have Modems.
- supports full Prestel colour alpha and graphic characters including double height, flashing, conceal/reveal.
- called by simple *PRESTEL (*P.) command. Disc and tape configurations fully supported.
- includes a comprehensive telesoftware downloader for BBC and other programs with continuous on screen status report (an essential facility).
- has very powerful OFF LINE MAILBOX editor allowing colour flashing graphic mailboxes to be prepared without having to be on line to Prestel.
- auto logon sequence can be burnt into ROM if desired.
- a vital 'TAG' facility allows tagging and recall of interesting pages, avoids that common and annoying 'NOW WHERE WAS THAT PAGE' problem.
- includes simple page and program loading and saving functions for both disc and tape, automatically assigning frame and program directories.
- not one but TWO PRINTER DUMP ROUTINES are provided within the software allowing either full graphics dump (mode 7 to EPSON compatible printers) or ASCII characters only.
- a user function built into the software allows interface with specialist routines, (yours as well as ours).
- All the above facilities are accessed via function keys. An overlay is provided to give comprehensive guidance to key functions.
- A 34 page comprehensive instruction/operating manual is supplied.

WATFORD'S 1200 BAUD FULLY AUTOMATIC USER TO USER SOFTWARE

Having purchased the WATFORD PRESTEL TERMINAL which includes the 1200/75 baud MODEM 84 the addition of the WATFORD user to user ROM based software enables you to discover a whole new world of data communication.

This software enables you to use the MODEM 84 very powerfully.

- Send and receive error checked programs and files (even WORDWISE files) to and from other users at 1200 baud.
- 8k file transfer in under 2.5 minutes (approx four times faster than with 300 baud modems).
- The transfer of data is totally AUTOMATIC which means that the modem is automatically switched between transmit and receive under software control.
- A chat mode is provided which also has this automatic switching for receive and transmit. (This mode is essential just before and after data transfer when both hand sets are replaced to reduce noise).
- A copy facility is provided which allows transmission of all screen output.
- A continuous on screen modem status report is included.
- The software is totally function key driven enabling easy transmission, reception, saving and loading of programs and files (Basic, Machine code or Data).
- A help menu is available from within the software as an aid to use.
- Full instructions are supplied.

PRICES

MODEM 84 (with Lead & Manual)	£68
MODEM 84 complete with PRESTEL SOFTWARE ROM, Lead and Manuals	£82
PRESTEL SOFTWARE ROM + Manual	£20
USER to USER SOFTWARE ROM	£15

(Carriage on Modem £2)

EPSON DUMP ROM

This screen dump ROM is specifically designed for use with the Epson RX/FX printers and the Kaga KP810. It is extremely simple to use as there is only one command to remember. It will accurately dump any screen mode using multiple tones as required. Mode 7 is fully supported giving teletext graphics, double height etc. For those who like to keep life simple this EPROM is only **£20.**

FORTH ROM for BBC

This ROM provides a complete implementation of the FIG-FORTH standard (including editor). Supplied with a large tutorial manual at only **£33**

TINY PASCAL for BBC Micro £59

VIEW

VIEW WORDPROCESSOR

We are supplying the new VIEW version 2.1 allowing printing of memory contents etc. .. **£49**

FX80 PRINTER DRIVER

Watford's own Sophisticated VIEW Printer Driver for FX80

To simplify using the full facilities of the Epson FX80 or Kaga KP810 use this printer driver. Full facilities are provided for selecting between fonts etc. The disc includes examples of use and instructions. Available on 40 or 80 track disc (please state which required). **£6**

VIEW PRINTER DRIVER FOR SILVER REED

(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of Printers and Typewriters. The View driver allows access to all of the features supported by the range of daisy wheel printers (EXP 770/400/500/550). These include underlining, bold, shadow, superscript, and subscript printing. Additionally, you can use proportional spacing on the EXP 770. Owners of one of the typewriters in the range EX 55/44/43, using it as a printer, can also access underlining with these drivers.

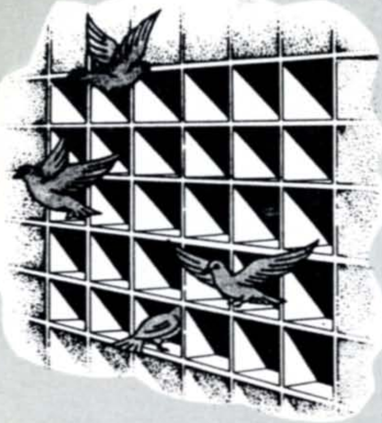
The features of each printer/typewriter are accessible from the two highlight codes, which can be redefined at any point within the text.

The printer drivers also extend the facilities in View to allow the use of pad characters.

The printer driver on disk with a user manual is at a special introductory price of **£7.50.**

Please specify printer type when ordering.

TWO DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

Despite the ease of use this system provides all the facilities needed for complex data handling problems. The length of database that can be handled is only limited by the total space on the disc. You can have up to 20 fields with page length records up to 254 bytes in length. Adding and deleting records, amend titles, field names and records. Sort on any field and search for any record or group of records in any field. The database may be re-formatted after creation, the system will re-write all your files for you automatically. You may add extra fields and extend the length of existing fields freely.

Output formatting is very powerful. You are allowed 40, 80 or 132 column output modes going to printer or screen. Selected fields can be put in any order on the screen or printer, either across the paper or down. Output can start or stop anywhere in the file. Decimal fields are automatically totalled and records output are counted. Version 2, now on sale has improved input and amendments procedures giving full record edit as well as the 3 extra features . . . String searching, Calculations on numeric fields, and the ability to create sub files from your main files.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer. File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density.

The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.

Cont.

Operations supported are –, +, *, /, +–999999 9999.9999 and compare facilities =, >,<>,<=, >=, <, &,.

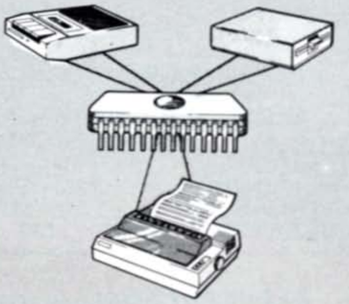
Many keywords are supported by the language: assign, compare, display, end, goto, iff, ift, print, read, search, spool and update.

Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

Only £43

(Please specify 40 or 80 tracks for the utilities disc)

BUFFER & BACKUP ROM



For those with sideways RAM fitted in their machines this utility ROM will make full use of this facility. By using the sideways RAM area for extra memory the following features are implemented:

★ 4K or 16K buffer for parallel printer.
★ Dumps selection of Disc files to Tape.
★ Makes backup copies of tapes on to tape and disc.
★ Displays contents of paged ROMs on screen.
★ Menu display of ROM filing system contents on Shift-Break.
★ Comprehensive manual.

Only £22

DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Introductory Offer: **£99**

PEN PAL–VERSATILE LIGHT PEN SOFTWARE

Do you have a light pen that never gets used? Then this piece of software is for you. This package offers many useful facilities that make the light pen a useful device to own. Facilities included are:

● Pixel, Line and Character definition
● Free hand drawing
● All Colours
● Fill, Refill and stripes
● User defined "Brush strokes" plus character definer
● Grid, Scale and perspective aids 2 to 200 points palletable in one design with Circles and "rubber banding"
● Move design/character to any screen position
● Save and Load screens, User defined characters and line drawings for video titles, own programmes etc.

This program has many uses in education and at home. It is supplied with a comprehensive instruction manual.

Works with Watford, RH, Acorn User, DIY and many other Light Pens.

Prices

TAPE	**£10**
DISC (40 or 80)	**£11**

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your cassette programs to disc. If you have difficulties transferring your cassette software to your disc system then this is the answer. It handles 'locked' files and full length adventures (up to &&e blocks) and programs that load below &E00. It is very simple to operate with instructions supplied. It saves you time and money.

Price **£10**

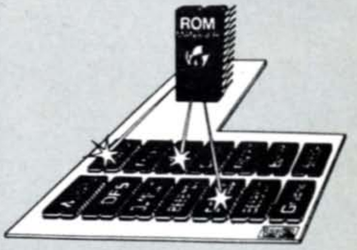
(Please specify 40 or 80 track discs)

ADE

Complete program development package in a 16K ROM. Full assembling and debugging facilities provided.

SPECIAL OFFER ONLY **£43**

ROM MANAGER



This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.

ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.

The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

The commands given in the ROM:

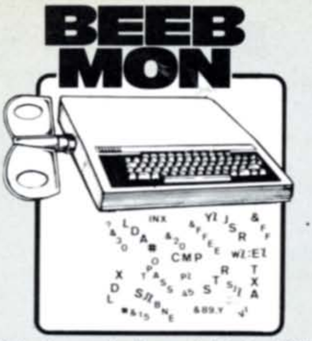
• CHECKSUM – Generates a CRC for a specified ROM (useful for testing suspected faulty ROMs).
•DIRECT – Passes a command directly to a named ROM (overcomes command name clashes).
•EXAMINE – Allows examination of a named ROM
•EXPLAIN – Gives detailed explanation of the first 22 *FX codes.
•FILE – Passes a command directly to the current filing system (which normally receives commands after all the ROMs).
•FUNCTION – Lists the contents of the function keys in a form suitable for editing.
•INCLUDE – Allows the main memory to be used for ROM development.
•MODIFY – Memory editing in HEX/ASCII format.
•NAMES – Lists the names and socket numbers of all resident ROMs.
•RAM – Sends command directly to the RAM based ROM routine.
•REMOVE – Removes RAM based ROM option.
•SPECIFY – Selects the default ROM.
•DEFAULT – Sends commands directly to the default ROM without having to give its name.
•STOP and •START – Disable and enable any named ROM to completely eliminate command word clashes.
•STATUS – Information about all the ROMs fitted in the machine including socket number, name, length, whether it is enabled, whether it has service or language entries etc.
•VECTOR – Same as *DIRECT, just in case *DIRECT clashes with another ROM.

All selection between particular ROMs is by the name of the ROM and this may be abbreviated for convenience. ROM numbers can also be used if required. This ROM is very simple and obvious to use. All the facilities are explained in the clear and detailed manual.

Price **£22**

Continued →

BEEB MON



Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.

In use as a debugging tool, you run code under a total emulation system. Everfelt a desperate urge to set a break point in ROM? No problem – you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.

Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a vertual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being excuted at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

£22

Disassembler Rom

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use programmers tool.

A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL, ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.

Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.

ONLY **£18**

WATFORD – Always a step ahead

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: **£32**

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in any of the following styles:

ABCDEFGHIJKLMNOP
abcdefghijklmnop
ABCDEFGHIJKLMNOP

ABCDEFGHIJKLMNOP
abcdefghijklmnop
ABCDEFGHIJKLMNOP

ABCDEFGHIJKLMNOP
abcdefghijklmnop
ABCDEFGHIJKLMNOP

ABCDEFGHIJKLMNOP
abcdefghijklmnop
ABCDEFGHIJKLMNOP

ABCDEFGHIJKLMNOP

It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V – press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.

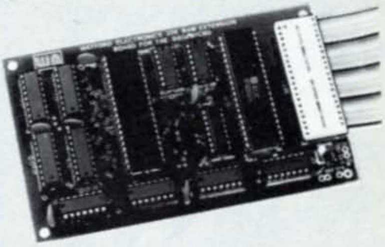
You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.

A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY **£39**

NEW LAUNCH

Watford fills the gap with a 32K RAM EXPANSION BOARD



Now Watford Electronics brings you the latest state-of-the-art memory expansion board for your BBC microcomputer. This compact board which fits inside the computer does not just give you 16K or even 20K of extra RAM, but a massive **32K!!!**

There are many useful facilities available with this board:

- The top 20K of the expansion RAM can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage. This allows good graphics and long programs to be combined. For instance you could have MODE 0/1/2 GRAPHICS AND 28K OF PROGRAM SPACE. The extra memory can be used by virtually any language or utility such as BASIC, VIEW, WORDWISE, etc.
- The full 32K or the bottom 12K of the expansion RAM can be used as a buffer for the printer, sound channels, RS423, keyboard or speech synthesiser. This allows very long text files to be printed while you are using 27K of program and 20K of graphics!
- This board is the ideal complement to any word processing system. There is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on – TWO JOBS DONE SIMULTANEOUSLY!!! (an equivalent printer buffer would cost you £115+).
- The board is compatible with a vast range of software and hardware available for the BBC microcomputer, including our ROM expansion board and double density DFS.
- The board is extremely easy to fit. It is supplied complete with a comprehensive manual and ROM based software with full *HELP messages.

SPECIAL OFFER

Only: £69 (carr. £1)

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimension to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£105**

All Prices Exclude VAT

SURGE PROTECTOR Plug

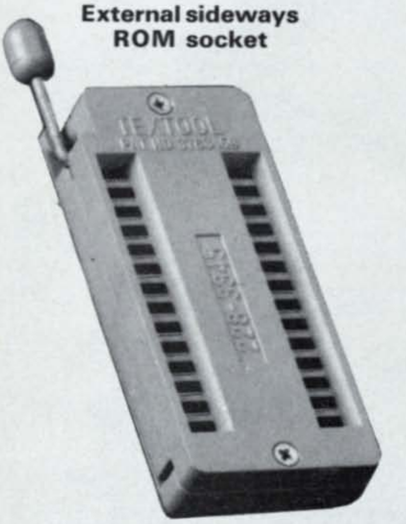
Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. Suitable for computers, Hi-Fi, Fridge Freezers etc. Max. Surge current 2KAmp; max. Voltage 250. Essential for serious computer users.

Protection for only **£8.50**

NEW LAUNCH

SIDEWAYS ZIF

External sideways ROM socket



At Watford we haven't forgotten those of you with small budgets, so we've produced a ROM board which takes only one ROM! But don't stop reading – this ROM can be changed in under five seconds without taking the case apart.

The SIDEWAYS ZIF eliminates the possibility of damage to your ROMs as zero insertion or extraction force is required when changing ROMs.

Included in the SIDEWAYS ZIF package is a specially designed see through storage container for your ROMs which protects them from mechanical and static damage when not in use.

Consider the features:

- Very simple to install, no soldering or modifications to the BBC Micro are required.
- Uses a professional ZERO INSERTION FORCE SOCKET (ZIF) so no force is required changing a ROM.
- No further expense, ROMs are used as supplied without expensive specialised cartridges. The storage box included stores up to 12 ROMs in perfect safety.
- Fits neatly into the existing cartridge slot on the lefthand side of the BBC Micro keyboard.
- The low profile design of the socket gives unrestricted access to the keyboard, unlike other cartridge systems.
- Allows easy installation and changing of Sideways ROMs, all without dismantling your BBC Micro. Once locked in position in the ZIF socket the ROM behaves as a normal sideways ROM.
- No more problems of running out of socket space, simply unplug the ROM and plug a different one in!

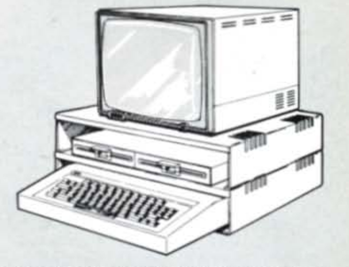
A REAL MUST FOR PROFESSIONALS
AND HOBBYISTS ALIKE

ONLY £16

BOOKS (No VAT on Books)

30 Programs – BBC Micro	£3.25
30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
36 Challenging Games for BBC	£5.95
40 Educational Programs for BBC	£5.95
100 Programs for BBC Micro	£6.95
Cassette version of above	£10.00
6502 Application Book	£11.95
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£14.25
6502 Machine Code for Beginners	£5.95
6502 Software Design	£10.50
A young persons guide to BBC Basic	£4.50
Advanced Machine Code Technique for BBC	£7.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Interfacing	£10.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC Basic	£7.95
Assembly Lang. Prog. on BBC	£7.40
BBC BASIC	£5.95
BBC Basic for Beginners	£6.95
BBC DIY Robotics & Sensors	£6.95
BBC Forth	£7.50
BBC Lisp	£7.50
BBC Micro An Expert Guide	£6.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Assembly Lang. Prog.	£7.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
Basic Programming on BBC Micro	£5.95
Best of PCW Software (BBC)	£5.95
CP/M Users Guide	£13.95
Creating Adventure Programs on BBC Micros	£6.95
Creative Graphics Cassette (Acornsoft). Has 36 graphics programs	£8.95
Creative graphics on BBC Micro	£7.50
Complete Programmer for BBC	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
DIY Robotics & Sensors with BBC	£6.95
Further Prog. for BBC Micro	£5.95
FORTH Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games on your BBC Micro	£2.95
Games BBC Computer Can Play	£6.95
Graphs & Charts on BBC Micro	£7.50
Graphic Art for BBC Computer	£5.95
Graphs and Charts (Cassette)	£7.50
Graphics on BBC Micro	£6.95
Hobbit (Book and Cassette)	£14.95
Introducing the BBC Micro	£5.95
Introduction to FORTH	£9.30
Intro to Micro Beginners Book (3 Ed.)	£9.90
Let your BBC teach u to program	£6.45
LISP	£9.25
Logo Programming	£8.95
Mastering VISICALC	£12.45
Mastering CP/M	£13.65
Micros in the Classroom	£4.90
Programming the 6502	£11.95
Programming & Interfacing 6502	£16.00
Programming the BBC Micro	£6.95
PASCAL	£9.25
Programming for Education on BBC	£5.95
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The BBC Micro Book, BASIC, SOUND & GRAPHICS	£7.40
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Using 6502 Ass. Language	£14.50
Wordstar & CP/M made easy	£6.95

PLINTHS FOR BBC MICRO AND PRINTERS

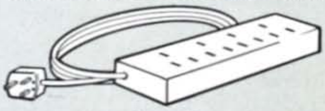


Protect your computer from the weight and heat of your monitor. BBC micro plinths have slots for maximum ventilation. Single height version is suitable for BBC and monitor. Double height version allows the disc drives to be used in the centre section or stationary, etc. The computer slides easily in to place, allowing easy access to remove the lid.

The printer plinth is equally sturdy but without the cooling slots. This allows the paper to be stacked under the plinth with the printer on top – a very convenient way to work as it does not require the usual very deep table.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**10** (carr. £1.50)

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.50

ASSORTED CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	£2.00
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to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	£2.50
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Microvitec RGB leads 6 pin DIN to 6 pin DIN for colourmonitors	£2.50
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Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

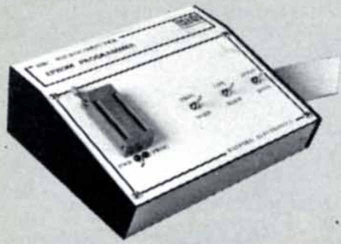
	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles)15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£12** (£2 carr.)

Continued →

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and integrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

ONLY **£79** (£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

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VOLTMACE DELTA 14 JOYSTICK SYSTEM

The Voltmace system provides full facilities for connecting the Delta 14 handset.
Delta 14 handset – On its own makes a high quality centre sprung analogue joystick with fire buttons **£12.50**
Adaptor Module allows use of two joysticks and provides hardware to access all the keys on the keypad of the joystick **£12.55**
Transfer program allows use of the keypad keys and joystick to simulate any key on the keyboard. This works by creating a machine code patch that stays in memory while another program is loaded in. Allows any game to be used with joysticks. Supplied on disc or tape.

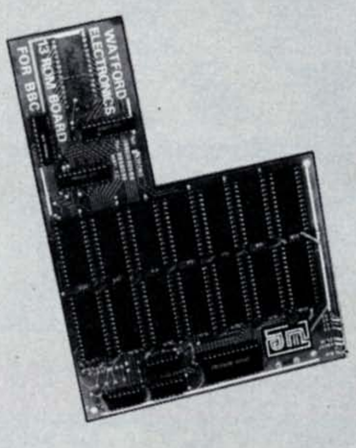
Tape **£5.10** Disc **£7.95**

STANDARD JOYSTICKS

These are standard analogue type with a fire button on each joystick. Twin joysticks go to a single moulded plug, long leads provided.

Single Player version **£7.00**
Two Players version **£12.00**

MK 2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. This board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, etc. (At Watford, we think ahead.)

Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

ONLY £32.50 (carr. £1)

THE INVESTIGATOR

A utility program provided on disc to make security backup copies of all your valuable discs. Makes full use of all 8271 facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering. Price **£25**

LIGHT PEN

This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only **£20**

(For software on disc please add £2)

DATA RECORDER AND ACCESSORIES

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter. **£20**

DATA CABLE to connect recorder to BBC **£2.50**

DATA CASSETTES – Top grade tested C12 Data cassettes supplied in library cases **35p**

MISCELLANEOUS

28 pin DIL PLUG	
Solder type	**£1.85**
IDC Crimp type	**£2.90**
28 pin ZIF SOCKET (Textool)	**£7.50**
34 way Ribbon Cable	**£0.60/foot**
8 way DIP SWITCH	**£0.87**

ANTI GLARE MONITOR SAFETY SCREEN

HEADACHES? TIRED EYES? Don't take pills — Use a Watford Electronics anti-glare filter! Considerable research into the possible health problems associated with monitor screens has shown that eye strain, blurred vision, watering, itching eyes and headaches can result after prolonged use. The problems are caused by extraneous reflections which force the eye to continuously re-focus to try to ignore them. The answer is our contrast enhancement, anti-glare filter which is similar to those which have been previously available on business systems, but at the low cost that you would expect for your personal computer. You will soon find the reduction in eye strain well worth your investment.
Features:

- Simple fitting with sticky Velcro pads.
- Easily removed for cleaning.
- Tinting improves colour quality and contrast.
- Works on monochrome or colour monitors.
- Curved instead of usual flat screen reduces edge distortion.
- Made in Britain by a long established glass maker.

Available in 9", 12" and 14" versions – please specify when ordering.

Introductory offer price: **£14.95**(carr.£1)

Prices subject to change without notice and available on request.

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Strategy enters the shoot-em-up scene

TRYING to review **Elite** (Acornsoft) is rather like trying to re-write the BBC's manual to fit on a postage stamp. This is the first Acornsoft megagame and let's hope that there are more to come.

It is based around Traveller, a role playing game first developed some eight years ago.

You are a space ship commander trying to make an impact on the world of intergalactic trade. You begin with a very basically equipped space ship of the Cobra MkIII combat and trading type, containing a single forward laser and three missiles.

You have 100 credits with which to buy your cargo and now you start your first mission. Against you are several different types of enemy craft among the 16 or so types that ply the same routes as you.

Most of the other craft are far more manouvrable and powerful than your ship and this can give you a great many problems in the early stages.

As you accumulate your fortune you can customise your vessel to maximise your chances of survival – extra computers, lasers, space scoops, power supplies and even a large cargo bay on offer besides the fuel, missiles and energy bombs.

The price of these items vary from 30 to 6000 units, but you can only buy certain items on certain planets.

There are more than 250 planets in each of the eight galaxies so there is plenty of scope for exploration and profit.

One criticism that should be made is that there is no scope for alliances, which could have made the whole game much more interesting.

Not that the game lacks in interest – it is the type that keeps you up at night and leaves you feeling somewhat drained the day afterwards.

The graphics are one of its major features and can only be described as spectacular. The program gives the impression that there are two screen modes, in windows, at one and the same time.

The top of the screen is the view from the window of the craft while the lower part gives an instrument panel reading. The most interesting feature on the panel is the three dimensional radar screen showing both the location and relative height of all raiders in the vicinity.

This usually means trouble, and an empty screen means a happy life.

There are a number of other screens in the program – short range scan, galactic scans, status, market prices and planetary information – in all a vast array of data which can be very hard to take in on the first few occasions.

The package contains a 64 page training manual, a quick reference card, a 48 page novella, a function keystrip, a spaceship recognition poster, loading instructions and a competition entry card.

This is not a game for the dyslexic! It is not over priced and should keep the kids quiet for many many eons.

Dave Carlos

Answer to that 'if only' question

HAVE you ever heard a teacher saying about your child: "If only he would learn to concentrate"? If you have, then **Hide and Seek** is the program for you.

Like all tapes from Applied Systems Knowledge loading is simple, reliable and quite foolproof. The child has a choice of three related but different activities, the first being Find It.

In this game, six pictures appear one at a time at the bottom of a screen. They are then automatically transferred into one of the six boxes forming a block in the main part of the screen.

When all the boxes have been filled and the child has therefore seen some objects for a considerable number of seconds, delightful candystripe blinds roll down over each box, with appropriate sound effects.

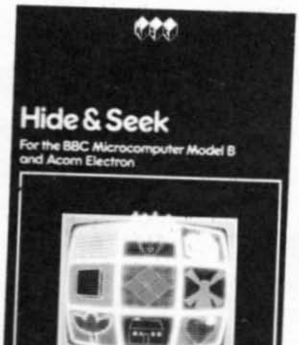
When all are covered, and the child has pressed the space bar, a clone of one of the six objects is drawn below the block and the child has to decide which box contains its twin.

This is simply done by pressing the space bar to move the black marker around the boxes. Pressing Return removes the blind and the child finds whether or not he had chosen correctly.

If the pictures do match, that blind remains open, and the process is repeated. An incorrect choice is once again covered up and the child has one further option to choose correctly before the correct box is revealed.

Our younger children spent a long time on this program, but when they felt more secure they moved on to Seek It.

This is similar, but there are further options in the program which determine how long the child sees each picture in its box, and whether the shutters closed all together or individually.



Eventually some hardy souls will try their hands at the final choice, What's Missing? This allows the student to brush up either reading or spelling.

Both games are similar, but in one the child has to decide which word appearing on screen tallies with the object mysteriously removed from the set of six.

The other game requires the child to select the correct name and then spell it correctly.

Two added bonuses – the cassette is compatible with the BBC and the Electron, and for disc owners, there is at last a disc copy available.

Phil Tayler

Ideal for the well armed student

BIOLOGY is a suite of 21 short programs by B.G. Mainwaring for use with CSE 'O' and 'A' level students.

There is very little given in the way of documentation, merely two sides of a small card giving program names, loading times and brief descriptions.

Details are also given on how to run them on a BBC Micro that has an active disc filing system and also how to save the programs on disc if desired.

Most of the programs are introduced with audible as well as visual cues. In principle this is a good idea, but the thought of the sound of several micros running these programs at the same time is horrendous.

After a somewhat irritating introductory sound sequence,

⟶

From Page 47

program one produces a nice colour display of the human skeleton. A series of 10 questions asking for correct labelling of bones follows.

Program two demonstrates levers in the body and others cover the female mammalian reproductive system and menstrual cycle, mendelian genetics, genotypes, biochemistry, the central nervous system, the mammalian ear, blood circulation and the mammalian eye structure and function.

Clearly you get what you pay for and at £12.50 each program costs only 60p. Not bad!

For those teachers who have some ability to program it would be desirable to add more features to this package in order to enable it to be clearer and less student prone.

Biology from Silverland has a lot going for it. It would be best used by individual students who were well-armed with notes, rather than for class demonstration and would be of most use if stored on disc to enable rapid access.

Peter Hillman

Watch out for the red haircuts!

IN **Screwball** from MRM you have 60 seconds to change the colours of every square in the complex grid that surrounds you simply by jumping on them.

Pestering you all the time though are four evil black bugs – with terrific red haircuts!

As you progress through the levels they become increasingly harder to avoid, so to get rid of them you can dig holes for them to fall into.

If they do fall in you receive a large bonus but they sometimes cheat and jump over squares.

If they catch you, you lose a life. But if you're really in a mess you can hyperspace to the top of the grid although you won't always survive this journey.

The screen layout is good. Your score, level, lives and time left are all displayed. The graphics resemble those of Q-Bert. Sound effects are excellent, adding to the fun.

MRM
SOFTWARE
SCREWBALL
FOR THE BBC 32k (OS 1.2)

It has all the usual features. There's a high score sheet, sound on/off and a freeze-game facility.

The selected keys make control smooth but, unfortunately, no joystick can be used. It's a one player game but as there's nothing complex to learn, it is popular with all the family.

I found it most addictive. Screwball is fun, fast and good value for money.

Simon Rubins

Fine, when THe is sorted out

SPELLCHECK from Beebugsoft is a spelling checker utility available on disc in two versions – as a companion to either Wordwise or View word processors. The Wordwise version is described here.

The package contained two single sided discs – a program disc and a dictionary disc – and a 12 page instruction booklet.

Following an auto-boot, the system is menu driven throughout and basically involves the choice of drives, loading of a text (Wordwise) file and selection of the spelling check option.

The textfile is then compared word for word – punctuation, numerics and embedded commands are ignored – against the supplied dictionary of around 6,500 words.

The base dictionary has a wide range of general usage words with varied endings and a

QUICK RUNS

A first look at some of the latest releases

Drumkit: *Let your Micro provide a rhythm accompaniment to your music using this fully programmable synthesiser. Samba, cha cha, rumba or rock – you name it, you can create it, using an on screen menu to control four drums and percussion instruments. You can store up to 4,000 beats and save the results for later use.* (Quicksilva).

★ ★ ★

Graph-Easy: *This package demonstrates the benefits of using graphs whether for CSE problem solving or as an aid to management decision making. Plots up to 30 points, connects, calculates lines of best fit, draws complex curves, differentiates, integrates and allows two curves on-screen at the same time.* (Hama Systems).

★ ★ ★

Space Station Alpha: *The deadly Cylon fleet is out to destroy Earth with its devastating lithium torpedoes. Earth's shields are gradually being drained as you try to wipe out the enemy before it destroys the planet.* (Icon).

★ ★ ★

Zorakk the Conqueror: *Journey through medieval lands in search of the long lost Crown of Ultimate Darkness. Battle with brigands, and suffer plagues and famine in your quest. Take the part of Zorakk and control your warriors in this graphic adventure.*

★ ★ ★

Serpents Lair: *A text and graphic geological adventure game for all the family designed to educate and entertain. Your task is to aid the Wizard in tracing the King's jewels. Fly your magic carpet around the world and meet a variety of animals and characters in your quest.* (Comsoft).

★ ★ ★

Gatecrasher: *This strategy game is designed to test your mind to its limits. Drop barrels down the chute of your choice to deposit them in a series of empty boxes at the bottom of the screen. Between entry and exit points the barrels roll through a maze of tunnels, the direction of flow dependent on moving gates.* (Quicksilva).

★ ★ ★

Home Accounts/Mail Order Control: *Designed for the average household with the normal compliment of bills paid by cheque, cash or standing order. It incorporates facilities for 25 standing orders, 150 bank or customer accounts and many others.* (BJ Software).

★ ★ ★

Test Match: *Text only simulation capable of playing any type of match from 20 overs to a full five test series. You choose the type of match, the teams, the bowlers and set the field. The computer takes over and plays the match ball by ball, indicating wides, no balls, maidens, owzats, and changing weather conditions.* (Quasar Education).

★ ★ ★

Smash and Grab: *As the robber you must collect gold falling from the bank* modicum of computer associated words, such as algorithm, BBC, binary, micro, processor and program.

Spelling is English not American, which should be a relief to CP/M software users, and includes some useful slang or abbreviations such as pub, Ltd, eg, ie, phone, telly, mummy and tummy!

When a textfile has been loaded and the spelling check option selected, the user is prompted for an automatic check or an attended check.

In the automatic mode, Spellcheck scans through the text marking unrecognised words. Though checking words against the dictionary is amazingly fast, it can be quite tedious to watch it scan a long document and a coincidental coffee break is recommended.

An average page of 300 words is checked in about two and a half minutes if all the words are also present on the dictionary disc, and about five and a half minutes if none of the words are recognised.

Obviously most normal text checks will be somewhere between the two.

Though it is somewhat tedious to use it is reasonably thorough and I will wholeheartedly recommend it when its one major deficiency is rectified – it cannot detect 'THe' and similar mistypings as incorrect.

This feature is available in some other spelling checkers and I'm sure could be implemented here. However, I do hear that there are some small program improvements and a more useful base dictionary on the way.

Mike Mahon

Simply magic . . .

ALL is peaceful in the garden. **Mr. Wiz** is going about his daily business of harvesting the cherries when suddenly, from behind the toadstool, a hideous beastie appears.

Will Mr. Wiz out-run the monster? Will this year's cherry harvest be affected? Will our hero be caught by the gremlins?

Only you can answer these questions as you play this exciting and colourful variation on the Mr. Do theme from Superior Software.

As Mr. Wiz you must negotiate your way around the garden in an attempt to collect all the cherries. As you move through the long grass you leave a clear path behind.

The gremlins, which appear at regular intervals from the central toadstool, will normally only travel along these clear pathways. Your only weapon is a trusty crystal ball.

To use this you must turn and face a pursuing gremlin and hit the space bar. This sends the crystal ball zig zagging along the pathway killing the blue meanie.

I would recommend that the crystal ball be used in emergencies only as it takes quite a spell to recharge.

Scattered around the garden are several large apples. By clearing away the grass directly below these you can cause them to fall vertically until they reach the next area of long grass. As your confidence increases you may like to try enticing several gremlins to follow you.

You then create a long path vertically upwards to the base of an apple and at the last moment casually side step it as it falls on the gremlin hoards.

Should you be feeling really adventurous – although suicidal may be more accurate – you can then devour the central toadstool and collect a bonus of 1,000 points.

All of this action is performed to the strains of Orpheus in the Underworld – Can Can to you and me – which unfortunately cannot be turned off.

Another oversight is the lack of a pause game feature. These two facilities are normally expected as standard on BBC games of this quality.

However, these two omissions aside, I can honestly say that this game is magic.

Jon Revis

window. Your opponent naturally is a policeman who trys to knock you into the water. Watch out for the flying cones and dustbin lids. Kick the flashing police box and give the bobby a ducking instead. (Superior).

★ ★ ★

Wallaby: *Vicious monkeys have stolen your baby Wallaby and hold it captive in a cage at the top of a tree. Using ladders and platforms you must get to your kin, boxing the enemy, which as well as trying to catch you, hurls apples at you continuously. Leap for the fruit for bonus points.* (Superior).

★ ★ ★

Paranoid Pete: *A world wheat shortage has sent Pete the space farmer to the surface of the planet Owwayondah. There, by digging holes he must plant the seeds as they fall from the ship. He must fend off the Megawibblies who are intent on greedy destruction. Successful growth on the planet leads to processing in the ship with yet more pain from the meanies as they materialise on board.* (Ubik).

★ ★ ★

Missile Strike: *Defend your cities by correctly positioning your laser sight and fighting off wave after wave of tumbling missiles. You control the laser from a central base and score bonus points for cities left standing and unused bolts.* (Superior)

★ ★ ★

Chess: *A computerised simulation of the classic board game. Pre-game options include set level, play, replay, save and load game, and problem solving. Additional options available at your move include take back, resign, modify the board, display of best move, change level and change colours.* (Superior)

★ ★ ★

Mutant Spiders: *Within a preset time limit you must rid the colonies of swarms of vicious three legged mutant spiders. Your only weapon is a laser cannon as you attempt to earn bonus time points by destroying them before they destroy you.* (Superior)

★ ★ ★

Football Pools: *This utility calculates the probability of any match being a home win, draw, or an away win. It lists in order of preference the best 16 score draws, homes, aways and draws and picks out those which have been given over-generous odds on the fixed odds coupon.* (Hartland).

★ ★ ★

Bouncing Bill: *Get Bill from the bottom of the screen to the basket of damsons at the top by jumping up onto walls through randomly moving gaps. Misjudge a gap and Bill hits his head and lies stunned for a while. You only lose a life if you fall through all the walls to the bottom, or you're caught by ghosts which increase in number on each successful screen. If you can catch a floating balloon you score bonus points.* (Oak)

Waste of valuable micro time

THERE are many valid, exciting and original ways of using the valuable time of the school BBC Micro – unfortunately **Mental Arithmetic Tests** from Small Schools Software isn't one of them.

It isn't just that a formal and rather boring subject should be chosen, but unfortunately the screen display, programming and general educational value are poor.

There are three programs, all largely written in Mode 7, but including none of the colourful graphics which that mode can support.

The individual test allows one of many topic and difficulty levels to be decided, after which a number of questions are printed on the screen.

They are identical to the formal maths books which most teachers now use with great care and suspicion, but add nothing to that format.

The programming is also a little suspect, for one is asked such undesirable questions as "What is the sum of £0.75 and £4.6?".

Even worse is the suggestion to use the class test on a screen in front of a whole class. I found myself wondering whether the author had ever faced a class of 35 children.

Tables is an unimaginative question-and-answer session, concentrating on one particular table at a time.

No, if a teacher at my school tied up a computer for such a trivial and unimaginative suite of programs as this I would be sorely disappointed, to say the very least.

Phil Tayler

Just the right blend . . .

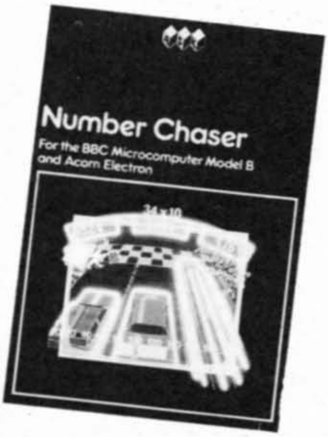
NUMBER Chaser by Applied Systems Knowledge has long been available on tape for the BBC Micro and it has deservedly gained great popularity in many schools.

This new version is for both the BBC and the Electron on tape and disc.

The program asks the child to decide which of four vehicles he will drive in the race. The easiest is a cycle, with an extremely hard level being set if the racing car is selected.

The idea is that the child controls the movements of one car while the computer drives a similar vehicle. A four lane raceway is drawn and a multiplication question appears at the top of the screen.

Below, one above each lane, are four answers. None is correct, but the child has to decide which is the closest.



The Z and X keys are used to move the car into the correct lane, and the micro car also follows into that track. If the answer is correct the child's car inches ahead of the other, another question appears, and the race continues.

When a wrong decision is made, the correct answer is shown while the screen freezes and the child's car moves back closer to the computer's car.

Too many wrong answers produce a crash while eventual success brings about a rather nice victory celebration.

The program has the right blend of enjoyment and educational purpose. I thoroughly recommend it.

Phil Tayler

Solving an age old problem

FOR years music teachers and parents have tried, by a variety of devious means, to get young instrumental players to regard practice as enjoyable.

Words like *joy, pleasure* and *fun* are used in the titles of many teaching methods, but they don't fool anyone.

Practise and Play from Special Business Software provides an interesting and exciting answer. The package is for the young player who can play an octave or so.

The program is designed to teach six pieces of music chosen from the top of the pop market.

It is accompanied by an instrumental part book and an audio cassette of pre-recorded accompaniments for each of the pieces.

The notation of each tune is displayed with or without a bouncing ball as the pitch of each note is sounded. The whole thing can be slowed down to suit the player and can be made to appear in short sections.

As little as one bar of music can be repeated indefinitely at varying speeds – an ideal way of getting to grips with the difficult bits!

The thing that provides the motivation for all this hard work

Save your planet – it's worth it!

IN **Renegade Robots** from Senator Software, you play a scientist trying to save his planet from deadly robots which have gone out of control.

To protect the laboratory you must re-align the three key control cubes. In order to do this you are able to slide the cubes by pushing them in the required direction.

The cubes will disintegrate if pushed against another cube or a border, but the key cubes cannot be destroyed.

The robots can be knocked out by squashing them against the cubes.

As the robots home in on you they can completely destroy the cubes – except for the key cubes – which are coloured differently from the rest. You are able to pick up a large bonus and an extra man if you can place the key cubes in a special way.

SENATOR SOFTWARE
RENEGADE ROBOTS

There are two timers in the game, one a preview timer and the other a bonus timer.

The preview timer allows you to work out your moves at the beginning of each screen, a nice touch which comes in very handy.

If the bonus timer reaches zero, then you move onto the next screen.

Each screen appears the same except that the cubes are placed in different positions and there are more robots which move faster.

The control is nice and smooth with keys or joystick and the graphics are good.

There are three levels of skill and I feel that with practice, players would soon progress to the third level, which is difficult but still enjoyable.

There are nice sound effects but the signature tune played before and after a game becomes a little tedious at times.

However you can turn the sound off at any time and there is also a pause-game facility.

Overall the originality and good graphics of Renegade Robots make it extremely addictive and well worth the money.

Simon Rubins

and diligence are the pre-recorded accompaniments.

Without them, this would be just another method. But the two complement each other so well that mistakes in the difficult bits make you dive back into the program until you get it right.

The tape is worth listening to on its own. In the main it consists of synthesised sounds, with one or two "real" sounds added for fun.

The honky tonk piano style of "This Ole House", the humorous bird imitations of the "Birdie Song", the steel band in "Brown Girl in the Ring", plus "House of the Rising Sun", "Amazing Grace" and "Can Can", all add to the fun but never lose sight of what it's all about – more practice and better playing.

In general, this is colourful music well presented, providing a lot of motivation and encouraging good listening habits for ensemble playing.

Instructions are always clear and easy to follow and the degree of user control makes it a joy to use.

Bill Noble

Playing shop brought up to date

BARCODES are very much a part of our world now. All items on supermarket shelves carry one. And when I rush to the library for information I am greeted with an assistant with a light pen reading these black and white stripes in the books.

Yet there are many of us with very little idea of what barcodes actually do.

One advantage for the shop is the relaying of the messages to a main computer, which will in turn organise the automatic restocking of shelves.

Beebshop is an attempt to demonstrate these ideas in the classroom, thus updating the "shop" found in many primary rooms. This project is aimed at a wider age range.

Although the printed notes suggest a lower-secondary group, I tried it out with my top juniors, and met with some success.

I have tried to avoid using the word program as the package – from Alpha Computer School – actually contains a program either on cassette or disc, teachers' notes and worksheets, and a small module which plugs into the AD converter.

In addition there are some acetate sheets with which you can make your own barcodes using the very clear and detailed instructions. The whole package is priced at £25, with further readers available at £18.

However the real test is how it performs in the classroom, and I have to report mixed results. When I first set it up I tried out the two barcodes which the company had thoughtfully provided for my review.

To the great delight of the children, the corned beef and the cod in mushroom sauce managed to be read as cats supermeat, vinegar and prime back bacon smoked!

Eventually it became obvious that the speed of movement through the reader was fairly critical, and I soon became adept at producing faulty bills.

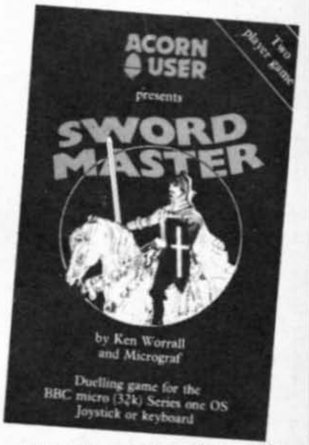
However the children met no such difficulty and so I had to bow to their superior youth.

Making the barcodes was easy, and quite a selection can be made simply and quickly. The software loaded with no problems. It allows each item passing through the reader to be displayed on screen. On pressing Esc a total cost is displayed.

A couple of months ago I used the BBC Buggy, which includes a program on barcodes, but I must confess that this one is a superior idea, having much more flexibility.

Phil Tayler

Arguments settled with armed combat


ACORN USER
presents
SWORD MASTER
Two player game
by Ken Worrall and Micrograf
Duelling game for the BBC micro (32k) Series one OS
Joystick or keyboard

THE sun blazes down on the secluded valley as the knights draw their swords and prepare for combat. That's the setting of **Swordmaster,** a new and highly original two player game from Micrograf.

Full instructions are loaded in with the first part of the game, as the BBC Micro plays as stirring rendition of Elgar's Enigma Variations.

The instructions tell of an order of mediaeval knights, the Teutonics, whose members occasionally settled their differences by combat in a secluded valley.

There were strict rules which the knights had to follow, some of which seem a bit severe. For instance you had to be male and over 14, which will no doubt cause a stir among feminists.

When the main game loads you are asked to choose between keys or joystick and then type in your names. The choice of keys is convenient as those for each player are at opposite ends of the keyboard.

These control your directional movement and your sword arm.

Once you have completed the formalities the battle commences.

The most exciting part of the game is pursuing your enemy and forcing him to fight. When you corner him the action is fast and furious as limbs are slashed and blows exchanged.

The sound is effective and the clang of the swords is particularly notable. But I think the most impressive feature is the super smooth graphics and the delightful animation. The motion of the arms and legs are among the best graphics I have seen on the BBC Micro.

You can progress through the rankings from greenhorn to Swordmaster, and also included is the ability to save your player onto tape.

I found myself playing game after game with my brother, and my best warrior got to be a novice before he met his end.

The game has a certain addictive quality and the only quibble I have is the lack of a one player game facility as I found myself with no opponents as soon as my brother departed.

The unvarying screen display could become annoying in the long run. But apart from this, Swordmaster is a highly entertaining and original game with excellent graphics and will appeal to a wide variety of gamers. Highly recommended.

Mark Wells

Useful...but quite limited

DESPITE its impressive title, **BBtype,** from Furey Enterprise, is a somewhat primitive word processor program. Its only major feature is the ability to load in predefined character sets such as accents of foreign languages and technical and scientific symbols.

This can prove quite useful for students preparing their work or for business letters where you may wish to impress a foreign client with your deep knowledge of the client's written language. But there are some limitations to the BBtype package.

For a start it needs the Acorn DFS – it certainly did not want to know about the Watford DFS 1.3 when I tried it. It also requires an Epson printer from the MX, RX or FX range using the parallel interface only.

The printer needs to be switched on when using BBtype, whether you intend to print or not, which is a little bit silly.

A simple menu requesting the character set you wish to work with starts the program. There

→

Computer Concepts

General:

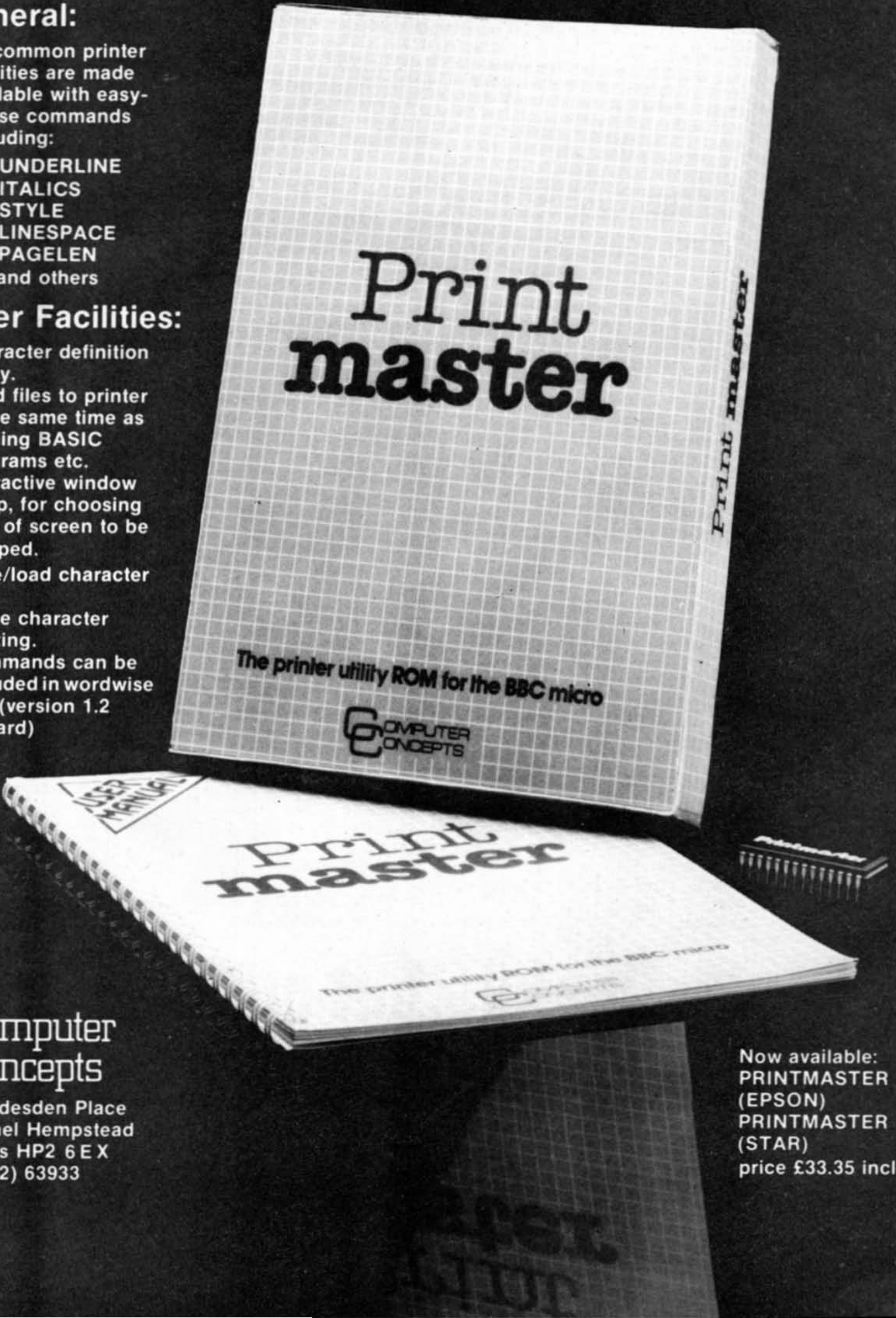
All common printer facilities are made available with easy-to-use commands including:

- ✱ UNDERLINE
- ✱ ITALICS
- ✱ STYLE
- ✱ LINESPACE
- ✱ PAGELEN

.... and others

Other Facilities:

- Character definition utility.
- Send files to printer at the same time as running BASIC programs etc.
- Interactive window setup, for choosing area of screen to be dumped.
- Save/load character font.
- Large character printing.
- Commands can be included in wordwise text (version 1.2 onward)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From Page 51

are currently five available, defined as French/Italian, German/Scandinavian, Spanish, Mathematics and Technical.

This leads on to another little menu which you use to set up the printer to print with or without vertical spacing between lines. This is to allow formulae containing maths symbols such as large braces to extend over two lines without an unseemly gap in the middle.

Editing capabilities can be best described as barely adequate. The whole document size is limited to 80 characters by 66 lines, and it is not possible to properly load in documents from other word processors such as View or Wordwise.

This is due to the fact that BBtype stores the document as a rather wasteful 80 by 66 byte matrix instead of using carriage return to delimit separate lines like most word processors.

There is no variable margination or centering and the lines scroll 10 lines at a time, which is something I found quite a strain to use after the smooth scrolling of View or Wordwise.

Using the function keys and the templates to access the pre-defined character set is relatively simple and quite effective. The edit area is 80 columns by 20 of white text on black using Mode 3.

It is not possible to use bits of two separate character sets in a single document, but each character set has up to 40 different symbols, which is quite enough for most purposes.

Most of the editing features are accessed via the combination of the Control, Shift and cursor keys in various permutations, and another template is also supplied for reference.

Maths users may be interested to know that it is not possible to create superscripts for little symbols such as the square and cube of a number.

There are some unusual features in BBtype in that pressing Break does not seem to harm the document, and with certain limitations, it is even possible to exit from BBtype into Basic to perform calculations and return back into the program.

The print quality produced is quite good, though all the printing seems to be done in graphics mode only, which can make document printing very slow.

In conclusion, for those really desperate for the special character sets it may be worth suffering through the editor to produce your documents.

Chris Chan

Childhood wonders revealed

FOR all those who spent hours of childhood gazing down into the depths of some watery pool, wondering what was going on beneath the dark canopy of lillies and bind weed, all is now revealed.

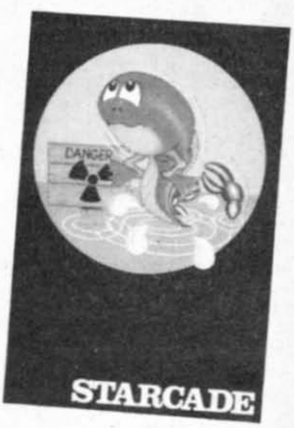
Savage Pond, the latest release from Starcade, centres around the life of a small, helpless tadpole as it tries to survive to adulthood among the many sinister perils of the deep.

This fast moving arcade type game is set in a cross sectional representation of a typical country pond – with one or two unexpected additions.

The idea is to guide your tadpole through life, fattening it up until it develops into a fully grown adult, and then to build up a colony of thriving frogs.

You control the tadpole by using joystick or keyboard – the standard Snapper keys with the addition of the space bar and Shift.

The controls give great manoeuvreability, and you need every bit of it as you dodge about the waving tentacles of the deadly hydra, chase after the nutritious worms and fatten yourself on the plump amoeba.



As you progress the waters become ever more hazardous with the addition of jellyfish, radio-active waste and rampaging dragonfly nymphs.

Should you survive all these you gain your first frog – a truly magnificent sight as he sits proudly on his log, lashing out his sticky tongue at the unsuspecting dragonflies above. Despite any feeling of success you might now be having, the game is far from over.

The graphics are quite spec-

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tacular with smooth, sprite-like performance equal to the best arcade games.

The use of sound was rather limited, with only single notes being used instead of the almost symphonious accompaniment given to so many of today's games. Truly the only real faults in such an excellent game.

Tarquin Thomas

Familiar uncle lacks polish

THE obligatory bad guy of this scenario is bearded, balding, bespeetacled, and head of a giant electronics company. His name is **Uncle Claude** and I'm sure his face is familiar but I just can't place it . . .

His company produces a whole spectrum of electrical goodies. But in an effort to increase the value of his goods Uncle Claude is stockpiling his products – probably for 28 days!

Our hero, according to the instructions on the disc cover, is named Micro Mickey. At least I think that's his name because when I loaded the program the title screen called him Electro Freddy.

UNCLE
CLAUDE
Alligata
For BBC Model B

This minor discrepancy aside, it is our schizophrenic hero's task to sneak into the factory during the night and load the products onto a conveyor for distribution.

However unknown to Mickey, Uncle Claude has been tipped off about Mickey's night shift and is lying in wait.

The cleverly written description on the cover whets one's appetite in preparation for the arcade action to come. Unfortunately, as is often the case, the game itself was an anticlimax.

The animation was smooth, the characters colourful – there was even an ambulance which zipped across the screen to take Mickey away when he'd been zapped by Uncle Claude – yet the game had no character.

I found that I had to force myself to continue playing in order to write this review. I'm afraid it can only be described as unpolished.

I noticed that the title screen bore the name of Softspot, the company which produced the graphically stunning Transistors Revenge and the humorous and well presented Fruity Freddy.

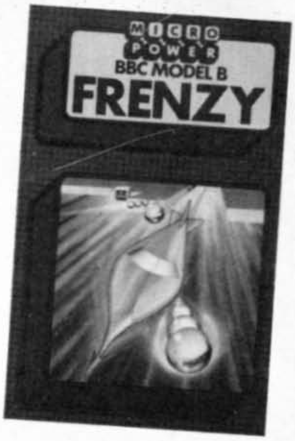
I see now why they passed Uncle Claude on to Alligata.

Jon Revis

Frenzy rekindles arcade bug

TO BE perfectly honest I must admit I've always been an adventure fan first and foremost.

However Micro Power's **Frenzy** is the sort of gripping arcade game that makes me wonder how well-founded my convictions are.



While it is similar to Painter you soon realise how good a version it is.

You start with a blue screen containing an odd little object bouncing around – the Lepton. As you manoeuvre your craft across the screen it leaves a green trail behind it. When you regain the edge of the screen the area blocked off by this trail is coloured in.

Should the Lepton be inside this coloured area, bingo! You've completed your task, and you can sit back and have a small preen while the micro tots up your score.

Scoring depends on whether you've captured all the Leptons, how fast you managed this, and how much of the screen you filled. The craft has two speeds.

It's quite easy at first, but later screens become more difficult.

Chasers appear – small objects that plough round the perimeter and blow up your craft on contact – and the Leptons speed up and increase in number.

By screen eight, steering a clear path is about as easy as getting past an Italian footballer with your shins intact.

Difficult it may be, but it's addictive, and it has a number of nice features, such as being able to select to have the sound on or off.

The graphics are simple but good, and the control keys well positioned. There is also a high-score facility with the author's best score at the top.

An excellent idea, this, as it gives you a target to aim for. Not that I'm ever likely to beat him, as I have all the manual dexterity of a dead slug.

James Bibby

Plundering sounds like a good idea, but...

I CONSULTED the ship's display. The lookout had just sighted a warship. Should I be bold and order fully-fledged aggression? Or was a cautious retreat to replenish supplies at Port Casablanca to be the order of the day?

I reflected on my previous battle. I had captured 3,000 gold pieces from a galleon but at the cost of many damage points to the ship and several of my crew. Had it been worth it?

That could be described as the main course of the bill of fare served up by **Plunder** (Strategy Games). The scenario takes us back to 1587 where the Spaniards are shipping gold from America to finance the preparation of the Armada. Your ship must intercept and force them to surrender their gold.

The main display consists of a neat but rather simple map of the Atlantic. Your ship sails on in changing weather until it locates an enemy. If you decide to attack, the screen displays both ships close up and the battle begins.

BBC Model B
PLUNDER
STRATEGY GAMES

This is the most disappointing part of the game. The ammunition fired by each ship is invisible and the player has no control over the battle except to decide whether or not to board the enemy.

If your ship is the worse for wear you can steer it into port for repairs, but this costs you hard-earned gold.

The graphics are hardly going to set the world alight but any such offering in this type of game is something of a bonus. The sound is disappointing.

My overall impression is that it is interesting idea which could have been executed better. See it for yourself before you buy.

Vijay Sundaram

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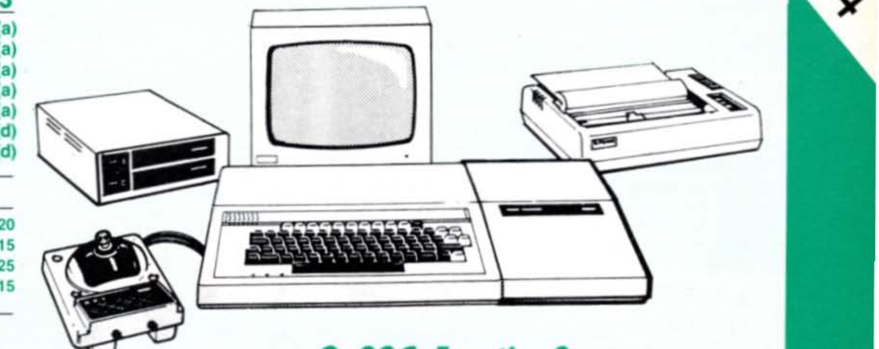

A BBC Family System

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This latest addition to the range of BBC upgrades will upgrade your BBC to a powerful 16bit business computer and make it disc & hardware compatible with the IBM PC. Its MS/DOS is customised to IBM compatibility allowing access to the massive range of IBM compatible software, programming aids, compilers and languages. It uses A8088 CPU at 5MHz, 128K or 256K ram, single or dual drive, software compatibility allows LOTUS 1-2-3, and other popular IBM PC business programs to run. Connection of the Graduate is simple, with just a connection to the 1Mhz Bus. The disc drives can be used in both BBC and IBM PC mode without needing an Acorn Disc Interface in the computer. The top-of-the-market GRADUATE Model G800/2 will come complete with the superb Xchange suite of programs, comprising a full feature word processor, a financial planner, a database, and a business graphics package. Although these programs are in modular form, they can be linked together to form an integrated software system that allows you to switch instantly between various tasks and to exchange the information between programs. G800/2 **£945 (a)**

Full spec & prices on application.

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

This month we are adding the new **KAGA** printers to our range of quality dot matrix printers. These printers, with their Epson compatible control codes are available in 80 col & extra wide 156 col versions. Features include NEAR LETTER QUALITY print using a 23 x 18 matrix, Dot addressable graphics in 8, 9 & 16 pin modes. Text modes include Normal, Italic, Enlarged, Condensed, Super & Sub script, Proportional spacing. Defined characters can be placed in ROM to give personalised print. An intergral 3K buffer, both friction & adjustable tractor feeds with built in paper roll holder, etc. etc. makes these superb 'value for money' printers unique.

KP810 (80 cols) **£249 (a)** (with free BBC cable)
KP910 (156 cols) **£375 (a)** (with free BBC cable)

We continue to supply the ever popular, definitive **EPSON** range. This 'industry standard' range provide reliability and quality 'second to none'. The budget RX80FT Dot Matrix, has 100cps and all standard printing and graphic functions as well as friction and tractor feed. The deluxe FX80 has all the above, as well as a 160cps, buffer, programmable characters etc. For wider paper use — up to 15" — the RX/FX100 are ideal.

RX80T **£215 (a)**
FX80 **£318 (a)**
FX100 **£450 (a)**
RX80FT **£230 (a)**
RX100 **£345 (a)**

DAISY WHEEL

The Brother HR15 daisy wheel offers features normally found in printers costing far more. Features include: 14 cps, 3K buffer, proportional spacing, underlining, bold and shadow printing, two colour printing, super & subscript and many other features. Centronics parallel interface is fitted as standard.

BROTHER HR15 **£349 (a)** (With free BBC Cable).

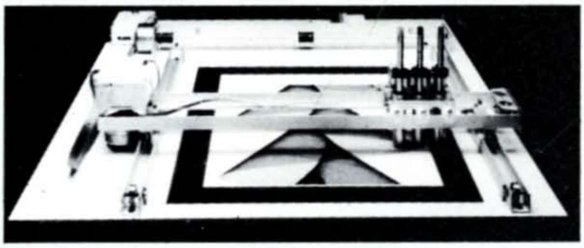
The JUKI 6100 daisywheel with 20 cps, 2K buffer, and switchable 10, 12, 15 cpi + proportional printing. A linear motor ensures optimum reliability.

JUKI 6100 **£345 (a)**

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without loosing the accuracy. The servo controlled drill/router, and scriber can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs.

Workstation Complete **£490 (a)**;
Basic Plotter **£270 (a)**.
Software on Disc **£3.00**; Opto Sensor **£72**.
Power Supply: PS12V **£42**; PS24V **£78**.
Drill/Router Attachment **£79**; Scriber **£7**.



TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON
Paper Roll Holder **£17 (d)** FX80 Tractor Attachment £37 (c).
Interfaces: 8143 RS232 **£28(c)**; 8148 RS232 + 2K **£57(c)**;
8132 Apple II **£60(c)**; 8165 IEEE + Cable **£65(c)**.
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 **£5.00(d)**; RX/FX/MX 100 **£10(d)**;
FX80 Dustcover **£4.50(d)**

KAGA TAXAN: RS 232 Interface + 2K buffer **£85(c)**; Ribbon KP810/910 **£6(d)**

JUKI: RS232 Interface **£65(c)**; Spare Daisy Wheel £14(d); Ribbon **£2.50(d)**
Sheet Feeder **£199(a)**; Tractor Feed Attachment **£99(a)**

BROTHER HR15: Sheet Feeder **£199(a)**; Ribbons Carbon or Nylon **£4.50(a)**

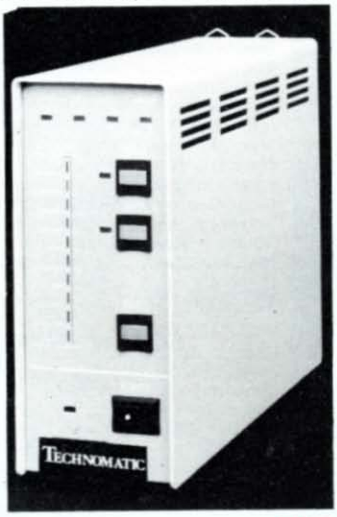
BBC Printer Lead: Parallel (42") **£7(d)**; Serial **£7(d)**
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine performation (Clean Edge):
2000 9.5" x 11" **£13(b)** 2000 14.5" x 11" **£18.50(b)**
Labels: 2-3/4" x 1.7/16" in quantities of 1000
Single Row: **£5.25**/1000 (d); Triple Row: **£5.00**/1000 (d)

PRINTER SHARER BUFFER

A unique delux printer buffer/sharer providing a simple way to upgrade your computer system by allowing greater utilisation of existing equipment by reducing the waiting time for printing documents. Data from three computers can be loaded into the buffer which will continue accepting data until its 64K storage is full. The buffer will automatically switch from one computer to the next as soon as that computer has dumped all its data. The computer is then available for other uses. This is a compact unit measuring 7cm x 17cm x 24cm. A LED bargraph indicates the memory usage, with LED indication showing from which computer the data is being fed from. There is simple push button control for PAUSE, RESET, and COPY facilities. The copy facility is ideal for continually printing copies of a document without 'tying up' the computer. Built in mains psu.

SP110 BUFFER/SHARER incl one cable set **£275(b)**



PRINTER SHARER

Three Computers to one printer (parallel)	**£65(b)**
Six Computers to One Printer (parallel)	**£129(b)**
Cables for Three Way Sharer	**£25(c)**
Cables for Six Way Sharer	**£38(c)**

COMPUTER SHARER

Two Printers to one Computer	**£19(c)**

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 x 192mm + menu area. Comes complete with a CAD packag. **£120** (b).

VIEW PRINTER DRIVER FOR FX80/KP810

This driver allows the use of all FX80s fonts to be used in text written using the VIEW rom. If user defined characters are held in the printer buffer they can also be used within the text. Manual and Disc includes examples of document layout and user definable characters. Supplied on 40 or 80 Track disc.............. **£7(d)**

Printer Drivers for NEC PC8023, Brother HR15 and Juki 6100... **£7(d)**

01-208 1177

Please add VAT and carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1. Carriage (a) sent by Datapost.

MONITORS

A choice of high quality RGB and Monochrome monitors are available. The British made **MICROVITEC** Std/Med/Hi Resolution 14" monitors offer a consistent reliable performance. Their resolution ranges from 452 pixels horizontal on the std res monitor to 895 pixels on the Hi res monitor. Std and Med res monitors are also available with RGB/PAL/Audio inputs. Dual input versions also available.

1431 Std. Res. RGB **£175** (a); 1431AP RGB/PAL/AUDIO **£225** (a); 1415 Med. Res. RGB **£255**(a);
1451 AP Med. Res RGB/PAL/AUDIO **£280**(a);
1441 Hi-res RGB **£420**(a); 2031 20" Std Res RGB **£260**(a).

The **KAGA** Vision III 12" RGB monitor offers a superb performance but in a smaller cabinet with a genuine etched anti-glare screen. **£358**(a).

The Japanese made **SANYO** and the **KAGA** monochrome monitors provide an ideal answer for an 80 character hi-clarity display. A futuristic swivel base plinth with integral clock is available for the Kaga monochrome monitors as an optional extra.

KX1201G with stand

SANYO DM 8112CX Hi Res Green Screen .... **£99** (a)

KAGA KX1201G 20MHz Hi Res Green with etched screen.... **£106** (a)

KATA KX1201A 20Mhz Hi Res Amber with etched screen .... **£114**(a)

Swivel Base for Kaga Green (fitted with digital clock).......... **£22.50** (c)

Note: All monitors are supplied with free BBC leads.

BBC Leads: Kaga RGB **£5**; Microvitec **£3.50**; Monochrome **£3.50** (d)

VIDEO DIGITISER

A high quality yet cost-effective unit offering uses for the scientific, educational and home user. Feeding in a video signal (this can be from a camera, VCR etc) will output to the BBC a high quality picture, with eight different grey levels. This picture can be stored on disc, manipulated or dumped to a printer. The friendly, yet sophisticated menu driven software comes complete with an Epson printer dump. **£213**(a).

SANYO DR101 DATA RECORDER

A high quality tape recorder with circuitry specifically designed for recording. Having switch selectable normal/data positions, as well as cue/review and a tape counter, it makes this recorder an ideal choice for anyone wanting a reliable tape storage device. **£30** (c). including free lead. Extra leads **£3.00** (d) Cassette **£3.00** (d).

RH LIGHTPEN

A superior quality lightpen, features including: adjustable sensitivity, LED output to show data transmission, microswitch tip. Full software backup. **£39** (c). The 'Lightpen Colour Graphic Software' pack helps you to draw line drawings as well as more complex drawings. Colour fill, point plotting, line, square, triangle, circle XY rulers are all available with rubber banding facility. **£7** cassette, **£9** Disc. The 'Artfun' pack provides full interaction between pen and screen. Allows your initial design to be shrunk into a high res format, and these images can be stored for subsequent use. **£7** cassette. The 'Word Master' encourages the use of correct grammar and is an excellent aid. **£7** on cassette. The 'Ed Master' uses a quiz format, and up to 160 questions may be programmed by the teacher. **£7** on cassette (d).

RAINBOW LIGHTPEN

Allow your childs creativity to run wild in colour, and develop their artistic potential — allows colour displays to be instantly drawn. Superb software includes facilities of saving and loading screens as well as an Epson screendump. £10.35 (c).

DISC DRIVES

DRIVE 1
DRIVE 0

Technomatic Disc Drives offer the best value for money. They come fitted with high quality slimline Japanese mechanisms & represent the state of art in disc drive technology. They are built to highest standards in design and production, and are all tested to their full performance capability before packaging. All drives are available with or without integral power supply. Dual Drives with PSU are supplied with generously rated integral switched mode power supplies. All 80 track TEAC drives are fitted with 40/80 Track switching at no extra charge to the user. Attractively designed steel casings are painted in hard wearing BBC matching beige paint. All drives can operate in single or double density modes. Drives are supplied complete with necessary cables, manual and formatting disc and are ready to be connected to the computer.

Single Drives

100K 40T SS:TEAC **£100(a)**; TEC with psu **£135(a)**

200K 80T SS: 40/80T TEAC **£155(a)** TEC with psu **£165(a)**

400K 80T DS:40/80T TEAC **£185(a)** Mitsubishi with psu **£195(a)**

3" 100K HITACHI Drive **£115(a)**

Dual Drives

2 × 100K 40T SS with psu: TEAC **£300(a)** TEC without psu **£225(a)**

2 × 200K 80T SS with psu 40/80T TEAC **£375(a)** TEC without psu **£275(a)**

2 × 400K 80T DS with psu 40/80T TEAC **£400(a)**

Mitsubishi without psu **£325(a)**

2 × 400K 80T DS with psu Mitsubishi **£400(a)**.

OFFER OFFER

SCOTCH 3M DISCS

Authorised Distributor
Data Recording Products

3M

This month we are offering these high performance discs at a bumper bargain price — not to be repeated again. The current offer will be valid for orders received until 30th October only. These discs are manufactured with advanced manufacturing techniques that have enabled 3M to set the industry standard. Their quality is such that their error free performance is guaranteed for life.

Discs in pack of 10 (c): 40T SSDD **£12.50(c)**; 40T DSDD **£17(c)**; 80T SSDD **£21(c)**; 80T DSDD **£22(c)**

DISC ACCESSORIES

Single Disc Cable **£6** (d) Dual Disc Cable **£8.50** (d)

10 Disc Library Case **£1.90** (d) 30 Disc Case **£8.00** (c)

Lockable Storage Boxes: 30/40 Discs **£14**(c) 100 Discs **£19** (c)

The FLOPPICLENE disc head cleaning kit is the ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminate the risk of recontamination and abrasion of the sensitive disc heads and ensure continuously reliable data capture and transmission.
Floppiclene with 20 disposable cleaning discs. **£14.50** (b)

COMMUNICATIONS

We offer the customer a choice of modems and suitable communication software, enabling the user to choose an ideal cost-effective system, perfectly suited to his individual needs. We stock modems for every requ'rement, whether it is for the business, or private user, whether you require access to a public database or a mainframe, whether for local or international use. We also carry suitable software — see our section on ROMS.

MODEMS

TORCH UNICOMM See our section on Torch for further details.

ACORN PRESTEL The dedicated Prestel adaptor complete with integral, BT approved, auto-dial modem and software in ROM £99(a).

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as intercomputer communications. It conforms to CCITT V21 300/300 Baud standard. Battery/mains powered. £65(c) BBC Lead £3.50 External PSU £8.

B.T. approved

WS2000 A world standard direct connect modem switchable between 75,300/300,600,1200/75,75/1200 baud. It is compatible with Bell 103/113/108, 202 and CCITT V21 & 23 standards and allows you to communicate with virtually any computer system in the world. This is one of the new generation modems, that will probably cover any communications standards you would ever need. This is the modem that will cover Prestel, Micronet, Telecom Gold, Distel, Microweb, One-to-One, Bulletin Boards both in the UK and abroad, etc. etc. as well as user-to-user communication. It also has a rather useful facility of 'Reverse-Prestel' mode i.e. 75/1200 so that you can communicate with other users who only have a standard 1200/75 type modem. What possibly gives this modem its biggest advantage is its option of computer controlled switching between all modes of operation. In addition, separate auto-answer and auto-dial cards are available, giving this modem possibly the greatest potential of all. Mains powered. £129(c).

POWER
Tx DATA
Rx DATA
CARRIER
ON LINE
VIEWTEXT
ON LINE
LOCAL TEST
CCITT

Please phone/write for details of optional extras.

TELEMOD-2 A BT approved modem complying with CCITT V23 1200/75 Duplex & 1200/1200 Half-Duplex standard, that allows communication with Viewdata services e.g. Prestel, Micronet etc., as well as using 1200 Baud for communicating with other computer users. Mains powered. TELEMOD 2 £65(b) BBC Lead £3.50

TERMI This is a semi intelligent terminal emulator allowing the BBC to act as a dumb terminal, slave BBC graphics terminal, or VT52 terminal. The rates at which data is sent or received is easily set up with rates of up to 4800 Baud with 40/80 col. selectable. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Termi is not suitable for PRESTEL). £28(d).

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). £59(d).

COMMSTAR This intelligent communication facility is extremely easy to use yet very versatile. It features a terminal mode, a full VT100 emulation mode and a special PRESTEL mode. In Terminal mode, all input may be copied into a buffer in memory over which full control is provided. Controls of protocols is very simple and any type of file (not just ASCII) may be sent using XModem protocols. The Emulation mode may be used using a disc based emulation file to emulate virtually any terminal type including VT100, within the capabilities of the BBC. In PRESTEL mode all normal Prestel features are available, including downloading of software, saving and retrieving of pages etc. etc. £29(d).

EPROMER II

Our current version of the highly popular Eprom programmer is now being enhanced to provide more and better facilities for easy programming by the user. The software will maintain its superiority over all currently available similar programmers. The range of eproms handled has been widened to include the eproms with lower programming voltage and eproms which can be programmed using the fast algorithm. Control of all operations has been moved to the keyboard. The screen display has been improved to give more information. The screen editing facilities have also been modified to simplify the data entry.

Preliminary Information

- The new Eprom Programmer will now program 2516, 2532, 2564, 2716, 2732, 2764, 27128 and 27256 + 5v eproms, and all but the 27256 in a single pass.
- The programmer will be supplied with integral power supply, and interfaces with the BBC via the 1MHz bus. It is fully buffered and complies with Acorn protocols. There is no power drain from the computer.
- No knobs or switches to fiddle with — total control from the keyboard.
- Fully software driven with easy to understand instructions displayed on the screen.
- Eprom type selectable from the keyboard.
- Selectable programming voltage 25/21/12.5V.
- Defaults to normal programming with high speed algorithmic programming selectable, for a device with suitable capability.
- Continuous screen display of eprom type, option and address range selected.
- Full screen editor with HEX or ASCII input. Constant display of logical eprom address.
- Can read, blank check, program and verify at any address/addresses on the eprom.
- Full Tape/Disc filing facility.
- Several basic programs can be entered on a single eprom and called up with individual name.

£102(b)

ATPL SIDEWISE ROM EXPANSION BOARD

This is a well constructed expansion board that does not require soldering in its installation. It will give you an additional twelve sockets, with 16K of battery-backed RAM option. Several link-selectable options include the choice of type of Eprom, and a 'write protect' for the RAM option. All the busses are full buffered. £39(d).

EPROMS 8K 2764-25 **£4.90(d)**; 16K 27128-30 **£18.00(d)**.
RAM 8K standard power 6264-15 **£26(d)**; 8K low power 6264LP-15 **£31(d)**.

SMARTMOUTH

The Original 'Infinite Speech' Synthesiser — Still the Best!
A ready-built totally self-contained speech synthesiser unit, attractively packaged with built in speaker, Aux. output socket etc. Optimum sound quality is achieved due to a tailored frequency response audio stage. It allows the creation of any English word with both ease and simplicity, while, at the same time, being very economical in memory usage. You can easily add speech to most existing programs. Due to its remarkable infinite vocabulary, its uses spread throughout the whole spectrum of computer applications — these include educational, industrial, scientific, recreational etc. — simply plugs into the User Port. No ROMs are needed. Smartmouth is supplied with demo and development programs on cassette (easily transferred to disc) and full instructions. £37(c).

UV ERASERS

UVT1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59(b).
UV1 as above but without the timer. £47(b).
For Industrail Users, we offer UV140 & UV141 erasers with handling capacity of 14 eproms. UV141 has a built in timer. Both offer full built in safety features UV140 £61; UV141 £79(b).

'TIME-WARP' REAL-TIME CLOCK CALENDER

A low-cost compact unit that opens up the total range of Real-Time applications, and adds a new dimension to the personal computer. Though built to exacting professional standards, it is at a price previously unattainable, and brings it within reach of all BBC Computer owners. With its full integral, battery backup, possibilites include an Electronic Diary, continuous display of 'on-screen' time and date information, automatic document dating, precise timing and control in scientific applications, recreational use in games etc. — its uses are endless and are simply limited by ones imagination. Simply plugs into the User Port — no ROMs needed. Extensive applications software supplied on cassette (easily transferred to disc) and full instruction manual. Please phone for details. £29(c).

TIME WARP
REAL TIME CLOCK CALENDAR

01-208 1177

Please add VAT and carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1
Carriage (a) sent by Datapost

ACORN IEEE INTERFACE

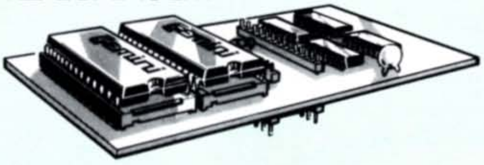
This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 separate IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £282(a)

ACORN TELETEXT INTERFACE

This interface enables a BBC Computer to receive and store teletext information transmitted by both BBC and ITV. In addition it allows the downloading of transmitted software. The unit comes with a ROM and user guide. £195(b)

DATABASE MANAGEMENT SYSTEM

GEmini DATAGEM



The Definitive Random Access, 24K ROM Based DATABASE MANAGEMENT SYSTEM.

Datagem is the first truly flexible database for the BBC Micro that can make your system really useful and efficient, saving you money in the long run. The system includes a carrier board containing two Eproms, demonstration applications disc in both 40/80T, professional documentation with quick reference card, and 'Trans' utility program. Features include: *almost unlimited file size (max 10MByte) *supports up to 4 drives *Max of 5000 records per file *max 6K record size *max of 62 fields *9 level hierarchical search system with facilities to store results of searches. Searches can be any one of the following: Search, Include, Exclude, Combine, Common or Difference *user defined variables *generates form letters from records. Please ask for leaflet. £112(c).

ACORNSOFT/MIRLE
Business software

A well designed, cost effective business system, having the advantage of being able to purchase packages individually, with the option of, possibly later, linking them with other packages. INVOICING, ORDER PROCESSING, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, STOCK CONTROL, PURCHASING, MAILING SYSTEM. £22(d) each.

SPECIAL CLEARANCE OFFER

Hell Driver;
Felix in the Factory;
Laser Command;
Martian Attack;
Cybertron Mission;
Alien Destroyers;
Chess;
Escape from Moon Base Alpha;
Swoop;
Alien Swirl;
Demon Decorator;
Android Attack;
Danger UXB;
Footer;
Moon Raider;
ZARM;
Eldorado Gold;
Galactic Commander;
Where?;
Labyrinth of La Coshe:
Chemistry;
Physics;
Constellation Croaker.

Only £2.50(d) each

BBC FIRMWARE

VIEW **Word Processor Rom on special offer at £48(c).**
This is the new version V2.1. Advantages include being able to print straight from memory, as well as editing in any mode. Complete with comprehensive manuals to Acorns usual high standard.

WORDWISE One of the most popular word processors for general use £34(d). Wordwise SpellCheck Disc — A must for any serious word processor user. Normal price **£16.50(d).** If bought with Wordwise: No p&p and only £14.

ULTRACALC From BBC Publications: The only spreadsheet ROM for the BBC that offers features found in the most sophisticated spreadsheet programs, like the handling of labels as well as numbers as values, and allowing a search by a meaningfull name instead of just a number etc. Efficient memory usage allows large spread sheets to be constructed. Facilities and commands include, variable width column, Sum, Replicate, Insert, Delete, & most mathematical functions. It helps to create and manipulate pricelists, balance sheets, payroll, c/flow forecasts, order entry, small databases, scientific calculations. £69(c).

VIEWSHEET **Ask for details** £52(c)

BCPL A full implementation of the BCPL compiler language from Acornsoft. It consists of the BCPL language ROM and a disc containing the BCPL Compiler, a Screen Editor, a 6502 Assembler, other utilities and program development aids, and some examples of BCPL code. A comprehensive 450 page user guide is included. It can be used to develop games programs and commerical packages, to develop system software, to write control systems, and to produce programs which otherwise would need to be written in assembler. £86(b).
BCPL CALCULATIONS PACKAGE: supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calculation files, example files and a comprehensive user guide. £17.30(b).

UTILITY ROMS

DISC DOCTOR This general purpose ROM adds 20 commands to the DFS system. It includes a formatter, sector editor, tape-disc & disc-tape routines, a powerful disassembler, commands for listing function key definitions for editing etc. This ROM will obliviate the need to go for non standard DFS systems (with their inherent disadvantages) as it overcomes many of the Acorn DFS's shortcomings. £28(d).

GREMLIN Contains a full machine code monitor including features such as a dissassembler, memory move and search routines. Also feature a full expression evaluator and an assembler. Can single step through ROM & RAM as well as any sideways ROM. Works in any mode with full status display. Up to 8 breakpoints can be used and it has a special mode for debugging graphic programs. £28(d).

EXMON This extended machine code editor provides 35 new commands. Features include machine code relocator, single stepping, memory search and full assembler & dissassembler. £20(d).

TOOLKIT This ROM adds 27 new commands to the BBC BASIC. These include a full screen editor, merge, relocating data in memory, program compactor, listing of variables and memory search. £23(d).

CARETAKER This adds 17 new commands to the BASIC which include: renumber, squash, exchange insert, single key entry of BASIC keywords etc. £28(d).

GRAPHICS ROM This ROM includes over 28 new graphics related commands which can be used in BASIC programs. Features include: sprites, LOGO Turtle graphics, fill routines, shading, large characters, rotation, scaling and 3D plotting all using '*' commands. £28(d).

PRINTMASTER This ROM features the most versatile screen dump for EPSON MX/RX/FX80 and Kaga 810 printers. It supports three types of dumps. The first allows any graphics on the screen to be dumped. Colours appear as shades of grey. Any part of the screen can be printed at any position on the paper in any one of four orientations. The screen dump may be magnified by any factor ×2, ×3, ×4 etc. A special feature allows true MODE 7 screen dumps with TELETEXT text & graphics. The second dump allows any text to be dumped whilst the third dump will print the contents of a file on disc whilst the computer is doing other things. This is not all. All printer functions can be called up using the ★command. ★DEFINE allows the user to define his own characters and store them. ★GPRINT allows printing of enlarged text in any position, orientation, size & shade. ★WINDOW allows windows to be defined in any size and position on the screen. **In short this one ROM does it all.** £28(d).

SOFTWARE

CP/M SOFTWARE FOR TORCH Z80 ACORN Z80 PROCESSOR

W can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. The following are generally available from stock.

DBASE II **£365** (a) WORDSTAR **£295** (a) MAILMERGE **£145** (a)
WORDSTAR/MAILMERGE COMBINED **£395** (a)
DBASE II TUTORIAL (All Lessons on Disc) **£32** (c)
PROPASCAL £220(a) **CP/M TUTOR £55(c)**
Phone for your specific requirements.
Please specify the type of format (TORCH or ACORN) is required.

MICROTEXT

This authoring system was developed by the National Physical Laboratories. It is a programming system designed to simplify the production of a wide range of man-computer dialogues. Using Microtext's simple commands, the user can draw up any number of 'frames', each containing text and/or graphics. A series of frames build up into a complete module. Each program can consist of more than one module. Using Microtext, an expert in any field can construct their own complete courses of computer-based instructional material. Applications include interviewing systems, teaching packages, training courses and interactive demonstrations and simulations. Available on Cassette and Disc. £52(a) **Disc;** £43(c) **Cassette.**

ACORNSOFT (d)	Disc	Cass
S-PASCAL	£17.30	£14.65
LISP	£17.30	£14.65
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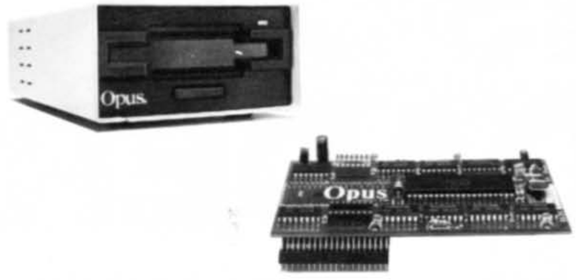

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DISC LOADER

ANYONE who has ever used a micro with disc drives will know the incredible feelings of frustration and impatience that accompany a return to cassette systems – they're so slow and restrictive.

However, one problem with nearly all disc filing systems (DFS) is that they require a block of memory for their workspace.

On most systems the locations &E00 to &18FF inclusive are reserved for the DFS.

If you are not spooling or execing files then PAGE can be lowered to &1100, to claim back more of the valuable RAM.

Some programs that use the high resolution graphic modes will run out of memory when they are executed. One way round this is to load the program above the DFS's workspace, put the machine into tape mode, then download the program.

However, once this has been done the disc system is disabled, and no more data can be saved or loaded from the disc without corrupting the program in memory.

You can get around the problem though.

In this, the first of two articles, I will explain how to load data from disc into any section of RAM above, without the need to up or download it.

The second article will show you how to save data to disc without corrupting any programs present in memory. To do this you have to move the disc system's work space to another position in memory.

Unfortunately this is not as easy as it sounds. The only way to alter the block of memory used by the DFS would seem to be to alter the DFS itself. This means re-programming an eprom with the altered code – a daunting prospect.

However we can write our own mini DFS.

The Floppy Disc Controller (FDC) chip in the BBC is the 8271, which is only capable of single density operations. Despite this chip being rather old fashioned, Acorn selected it in preference to double density FDCs.

Programming the 8271 involves reading or writing to locations &FE80 to &FE84, SHEILA &80 to &84.

These locations reflect the 8271's internal registers. Location &FE80 is the status register when reading, or the command register when writing.

Location &FE81 is the result register when reading, or the parameter register when writing. Location &FE82 is the reset register, and is therefore write only. &FE83 is unused. &FE84 is used to transfer the data between the disc and memory and vice-versa.

We are already provided with the &7F OSWORD call to program the FDC, but this also uses part of the DFS work space and is useless for our purposes.

To issue a command to the 8271 we must first of all check the command busy flag is clear. This is done by testing bit 7 of the status register.

If it is set we loop round, testing the bit, until it is clear. When it is clear we can poke the command number into the command register which is located at &FE80.

The command number is different for various operations – loading, saving,

MEMORY USAGE

&80,&81	Low and high byte of the data destination.
&82	Offset for &80,&81.
&83	Completion flag.
&84	Track number for read command.
&85	Sector start number.
&86	Number of sectors left to load.
&87	Number of sectors to be loaded from the present track.
&88	Low byte of start sector.
&89	High byte of start sector.
&8A	Number of files on the disc. This is decremented when one of the file names is printed onto the screen.
&8B	Number of files on disc.
&8C	File number counter.
&600-&6FF	Contains the file names, these are loaded from Track 0 Sector 0.
&700-&7FF	Contains the file attributes. (These are the load, save and execution addresses.) Also included are the sector address's for the files. These are loaded from Track 0 Sector 1.
&B00-&CFF	Contains the loading subroutine.

formatting and so on. For those interested in the technical details, a full set of the commands and parameters are given in the 8271 data sheets, available in the useful Hardware Guide for the BBC Micro from Wise Owl Publications.

Nearly all the commands need additional parameters, usually corresponding to the track number, sector address and sector size.

The parameters are issued in a similar way as the command. The only difference being that the parameter full flag is bit 5 of the status register and the parameter is poked into the parameter register, located at &FE81.

Once all the parameters have been sent to the 8271, the FDC will execute the operation specified. In all cases an interrupt will be generated when the operation is complete.

This indicates to the CPU (Central Processing Unit) that the command is complete and that the result register holds the outcome of the operation. The result register is located at &FE81.

If the command is a read or write command then an interrupt will be generated when data is required or waiting to be read.

To make the 8271 generate an interrupt when a data transfer operation must take place, the NON DMA (Direct Memory Access) mode must be selected.

When a NON DMA interrupt occurs, the data must be read or written immediately to location &FE84 or else the operation will fail.

It is for this reason that the interrupt generated must have priority over any other program currently being executed as the timing is extremely critical.

All of the interrupts generated by the 8271 are Non Maskable Interrupts (NMI). As the name suggests, the interrupt cannot be masked by software.

The 6502 has a NMI pin, and when the input to this is low, the 6502 will begin executing a piece of code whose location is given by the contents of locations &FFFA and &FFFB, and will return back to the piece of code previously being executed when an RTI (ReTurn from Interrupt) command is executed.

On the BBC Micro the NMI routine is at location &D00.

You may have been wondering why pressing Break causes the contents of location &D00 to be changed to &40. This is because the &40 is the RTI instruction, and means that when a NMI occurs it will exit the NMI routine without performing any operation.

But when you issue commands to the DFS, the DFS puts the required NMI routine into PAGE &D. Obviously the routine will be different for load and save. You can see the difference by dissassembling PAGE &D after a load or save operation.

Anyway back to the routine in question: the program puts a JMP (JuMP) instruction in PAGE &D so that when a NMI occurs, it will jump to a piece of code to handle the NMI.

The type of interrupt generated can be found by masking the bits in the status register. When the command has been completed, the result register must be read. This will show if any error has occurred.

If bits 1 to 4 are unset then the completion is good, otherwise an error has occurred. If so, the operation is aborted and an error message printed.

To allow the use of memory above &E00 the loading routine has been located in PAGE &B and &C, normally used for the function key definitions and user defined characters.

This allows us to load programs and data into any memory location between &E00 and &7FFF with a single call command. Unfortunately any programs which re-program the function keys or re-define the character set will corrupt the load routine.

To load a program you set the integer variable K% to the load address of the program – for example, K%=&E00 – and you then CALL&B00. If the program is Basic the value of PAGE and K% should be the same.

When the routine has been called, a menu of drive 0 files is displayed. Each file has an associated reference character.

Selecting a file is simply done by pressing the key corresponding to this character. The program will then be loaded into memory.

It should be noted that to stop the first few file names scrolling off the top of the screen, a VDU 14 command has been issued. This means that the Shift key must be pressed to reveal the remainder

→

From Page 63

of the file names, if any.

Also, the program only loads in multiples of one sector, that is, 256 bytes. This means a program of &24E bytes will take up &300 bytes when loaded in memory. This should be taken into account when loading several files into memory at once.

The program uses part of PAGE 0 and all of PAGEs 6 and 7.

When you have finished typing in the program, save it. Once you have done this, run the program in the normal way. Now the machine code routine will have been assembled into memory starting at location &B00.

The next thing to do is to save the OBJECT code. This is done by typing:

```
*SAVE "LOADER" B00 D00 <Return>
```

You must now set up a boot file which sets K% to the load address, changes the value of PAGE and loads in the program loader.

To set up the file type:

```
*BUILD !BOOT  <Return>
```

The number 1 will appear on the screen. Now enter the following:

```
*FX15        <Return>
K%=&E00      <Return>
PAGE=&E00    <Return>
*L. LOADER   <Return>
```

Pressing Esc will save the !BOOT file. To inform the micro that the !BOOT file is to be EXECed you must issue the *OPT 4,3 command.

After this has been done, booting the disc will set up the loader routine. To execute the routine type in the following:

```
CALL&B00  <Return>
```

● *That should keep you busy for this month. Next month we'll look at the other side of the coin – actually saving your files onto disc in the first place.*

70	Select cassette filing system, 1200 baud.
80-110	Load sectors 0 and 1 from track 0 into locations &600-&7FF.
120	Find out how many files are on the disc.
130-170	Display the file names.
180-190	Wait for a valid selection.
200-240	Find start sector for selected file.
250	Returns back to Basic if the disc contains no files.
260-300	Calculate the track and sector address for the file.
310	Copy the load address into &80,&81.

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PROGRAM DESCRIPTION

320	Store the track, sector and number of sectors to be loaded in zero page.
330	Change &D00-&D02 to a JMP instruction.
340	Set load address index register to 0.
350	Select NON DMA mode.
360	Turn drive 0 on.
370	Wait until drive is at operation speed.
380	Seek to track 0.
390-450	Calculate the number of sectors to be loaded from the current track.
460-470	Wait until drive is at operation speed before issuing the load command.
480	Wait until command is complete.
490-500	Test to see that all of the sectors have been loaded.
510	Print a carriage return before returning to Basic.
520-570	The main loading routine.
580-620	Routine to turn the drive on.
630-640	Keeps reading the drive status register until the drive is ready for operation.
650-690	Selects the NON DMA mode.
700-710	8271 parameter routine.
720	8271 command routine.
730-770	Puts a JMP instruction at the start of the normal NMI routine, so that my own NMI routine is executed.
780	Saves A and Y on the stack.
790	Tests to see if the interrupt generated is a NON DMA request.
800	Reads a byte from disc and saves it in main store.
810	Restore the A and Y registers and exits the NMI routine.
820	Check to see if the 8271 has caused the NMI.
830	Check to see if the interrupt was generated because of an error.
840	If no error has occurred, set the completion flag.
850-860	In the case of an error, print an error message.

```
   10 REM Disc Loader
   20 REM By Kevin Edwards
   30 REM (c) The Micro User
   40 K%=&E00
   50 FORL=0TO2STEP2:P%=&B00
   60 [OPTL
   70 LDA#&8C:LDX#12:JSR&FFF4
   80 LDA#0:STA&80:LDA#6:STA&81
   90 LDX#0:LDA#0:LDY#2:JSRMain_load
  100 LDA#0:STA&8C
  110 .Ready LDA&81:CMP#8:BNEReady
  120 LDA&705:LSRA:LSRA:LSRA:BEQEmpty
:STA&8A:STA&8B
  130 LDA#12:JSR&FFEE:LDA#14:JSR&FFEE
:LDX#0
  140 .Loop1 LDY#0:LDA&8C:CLC:ADC#65:
JSR&FFEE:LDA#32:JSR&FFEE
  150 .Loop2 LDA&608,X:JSR&FFEE:INX:I
NY:CPY#7:BNELoop2
  160 INX:INC&8C:JSR&FFE7:DEC&8A:BNEL
oop1
  170 LDA#15:JSR&FFEE:LDA#63:JSR&FFEE
  180 .Get_key JSR&FFE0
  190 TAX:SEC:SBC#65:TAY:CMP&8B:BCSGe
t_key
  200 TXA:JSR&FFEE:INY:TYA:ASLA:ASLA:
ASLA:CLC:TAX:DEX
  210 LDA&708,X:STA&88:DEX:LDA&708,X:
AND#3:STA&89
  220 DEX:LDA&708,X:TAY
  230 DEX:LDA&708,X:BEQCalc_track
  240 INY:JMPCalc_track
  250 .Empty RTS
  260 .Calc_track LDX#0
  270 .Next_track LDA&89:BNEGreater
  280 LDA&88:CMP#10:BCCMain_load1
  290 .Greater SEC:LDA&88:SBC#10:STA&88
  300 LDA&89:SBC#0:STA&89:INX:JMPNext
_track
  310 .Main_load1 PHA:LDA&42C:STA&80:
LDA&42D:STA&81:PLA
  320 .Main_load STX&84:STA&85:STY&86
  330 JSRNMI_change
  340 LDA#0:STA&82
  350 JSRNon_DMA_mode
  360 JSRDrive_on
  370 JSRWait_for_speed
  380 LDA#&69:JSRCommand:LDA#0:JSRPar
ameter
  390 .Next LDA#0:STA&83:LDA&85:BEQNo
rmal
  400 LDA#10:SEC:SBC&85:CMP&86:BCSSma
ll
  410 STA&87:LDA&86:SEC:SBC&87:STA&86
:JMPNormal1
  420 .Small LDA&86:STA&87:BNELast
  430 .Normal LDA&86:CMP#11:BCSMore:S
TA&87
  440 .Last LDA#0:STA&86:BEQNormal1
  450 .More SEC:SBC#10:STA&86:LDA#10:
STA&87
  460 .Normal1 JSRWait_for_speed
  470 JSRLoad
  480 .No_end LDA&83:BEQNo_end
  490 LDA#0:STA&85
  500 INC&84:LDA&86:BNENext
  510 JSR&FFE7:RTS
  520 .Load
  530 LDA#&53:JSRCommand
  540 LDA&84:JSRParameter
  550 LDA&85:JSRParameter
  560 LDA#&20:CLC:ADC&87:JSRParameter
  570 RTS
  580 .Drive_on
  590 LDA#&3A:JSRCommand
  600 LDA#&23:JSRParameter
  610 LDA#&48:JSRParameter
  620 RTS
  630 .Wait_for_speed LDA#&6C:JSRComm
and:LDA&FE81:AND#4:BEQWait_for_speed
  640 RTS
  650 .Non_DMA_mode
  660 LDA#&3A:JSRCommand
  670 LDA#&17:JSRParameter
  680 LDA#&C1:JSRParameter
  690 RTS
  700 .Parameter PHA
  710 .Busy LDA&FE80:AND#&20:BNEBusy:
PLA:STA&FE81:RTS
  720 .Command BIT&FE80:BMICommand:ST
A&FE80:RTS
  730 .NMI_change
  740 LDA#&4C:STA&D00
  750 LDA#NMI_routine MOD 256:STA&D01
  760 LDA#NMI_routine DIV 256:STA&D02
  770 RTS
  780 .NMI_routine PHA:TYA:PHA
  790 LDA&FE80:AND#4:BEQCheck
  800 LDA&FE84:LDY&82:STA(&80),Y:INY:
STY&82:BNEEnd:INC&81
  810 .End PLA:TAY:PLA:RTI
  820 .Check LDA&FE80:AND#8:BEQEnd
  830 LDA&FE81:AND#&1E:BNEDisc_error
  840 LDA#1:STA&83:BNEEnd
  850 .Disc_error JSR&FFE7:BRK:BRK
  860 .Error_message
  870 ]NEXT
  880 $Error_message="Load Error "+CH
R$0
  890 END
```

This listing is included in this month's cassette tape offer. See order form on Page 213.

SIX OF ONE OR HALF A DOZEN OF THE OTHERS?

1 SCRIBE

THE PROFESSIONAL WORD PROCESSOR designed for the serious user ■ All operations fully prompted ■ No special knowledge of the computer system necessary ■ Document size NOT limited by computer memory ■ Automatic disc buffering ensures text is moved between disc and computer memory without user intervention ■ Up to 255 pages in a single document ■ 80 column display ■ on screen underline and right justify ■ See it as it will be printed.

SCRIBE comes in a chip with 5 minute fitting instructions, utilities disc and manual.
DISC MACHINES ONLY.

£59.95 + 60p p&p

2 DATABASE

A superb information management system with an incredible operating speed.
96 fields per record ■ One record 2 Kb max ■ One field 900 characters max ■ 4000 records per database ■ 16 level conditional search ■ Find any record in 2 secs ■ Wild card search ■ Record match ■ 8 automatic sub indexes ■ Total flexibility of output via report writer with auto write back to any field ■ Maths pack ■ Semi programming language.

Integrates with Scribe to give conditional search with MAIL MERGE and high powered report formatting.

Database is in a chip.
DISC MACHINES ONLY

£49.00 + 60p p&p.

Scribe & Database in one chip

£95.00 + 60p p&p.

3 TYPEWRITER PRINTER

Based on the imperial 8008 this beautiful daisywheel typewriter features **MERLIN'S** own parallel interface tailored for your BBC computer.

Included are ■ keyboard buffer ■ auto repeat ■ electronic tab set and clear ■ decimal tab ■ 20 character auto correction memory ■ auto underline compatible with SCRIBE.

Comes with carrying case, instruction manual and ribbon connection to your BBC computer.

£299.00 + VAT

Next day Securicor delivery £5.00

Additions to your computer system depend upon each other for best performance. How often have you asked if this or that program is compatible with some piece of hardware?

MERLIN products for the BBC computer are designed to complement each other and so get the best from your system. Rest assured when you buy **MERLIN**, each addition is compatible with the last and is made to be the best available in its field. Combined with one another they are unsurpassed in performance or value.

Purchasers of MERLIN software are provided with a free update service and an unmatched level of technical support.

Merlin

MERLIN COMPUTER PRODUCTS

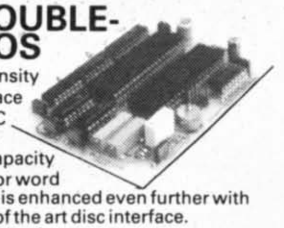
Please supply the following products/ information (Delete as applicable).

QTY ☐ ____________________
QTY ☐ ____________________
QTY ☐ ____________________

I enclose £ Inc P&P
My Credit Card No. is ____________________
Visa ☐ Access ☐ Tick which
Name ____________________
Address ____________________

To: **MERLIN COMPUTER PRODUCTS**
33/36 Singleton Street
Swansea SA1 3QN
Tel: (0792) 467980

4 DOUBLE-DOS



Double density disc interface for the BBC computer.

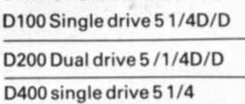
A high capacity database or word processor is enhanced even further with this state of the art disc interface.

The many features include ■ almost 800 Kb of CONTINUOUS file space on a standard 80 track disc drive ■ Automatically read standard Acorn files ■ Compensate for discs formatted in single density ■ Provide up to 156 files IN ONE DIRECTORY ■ Automatically read, write and format double sided drives to appear as one disc surface ■ Allow maximum use of **MERLIN** Scribe and Database.

Fitting to your computer is made exceptionally safe and reliable by providing connection via a flexible ribbon cable. Full instructions provided.

£109.25 + 90p p&p

5 DISC DRIVES



All of our disc drives are double density spec. and therefore if used in conjunction with DOUBLE-DOS give twice the standard Acorn disc capacity and feature head load light. Single drives are supplied in a double case to allow easy addition of a second drive.

D100 Single drive 5 1/4D/D	**£135.00**
D200 Dual drive 5 /1/4D/D	**£267.00**
D400 single drive 5 1/4 double side D/D	**£219.00**
D800 Dual drive 5 1/4 double side D/D	**£349.00**

For switchable 40/80. Add £26.00

ONE YEARS GUARANTEE
Next day Securicor delivery £5.00

6 MERLIN HYPERDRIVE

FOR RELEASE NOV 84

A 2 Megabite 5 1/4 ins floppy disc drive which will also automatically detect and read standard 40 and 80 track discs.

Size the same as a standard half height drive optional 400 Kb backup drive also available.

Ideal to maintain a large database or document file with high speed access.

Requires Merlin Double Dos.

£575.00

AMX MOUSE

POINTS THE WAY TO...

- *Faster interaction*
- *Creative Graphics*
- *Enhanced Programs*

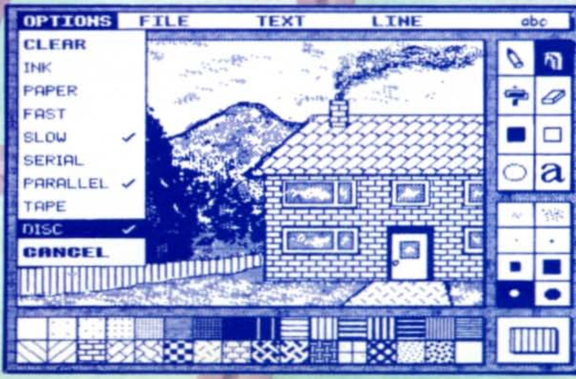
With the **AMX Mouse**, from Advanced Memory Systems Ltd, the BBC Micro joins a new league of powerful user-friendly computers. Natural hand-eye co-ordination allows the MOUSE to position the cursor quickly and accurately. Alternatively by moving the MOUSE you can input specially written new software such as ArtworX.

ArtworX is a powerful graphics program allowing scope to produce amazingly vivid pictures and designs on your screen and printer. Simply point to any of the ICONS (small illustrations) and you select options of patterns and implements. Other options are offered by pull-down menus. All features can be activated using just the MOUSE.

The AMX Mouse package includes ArtworX and an EPROM with software to enable you to use the MOUSE with existing programs and also lets you use the MOUSE's versatility in your own software. Just plug the MOUSE into the user port on a BBC Micro (model B) and the EPROM into a spare sideways socket.

Now simply fill in the coupon and we will send you an AMX Mouse with ArtworX with our full no quibble money back guarantee. OR phone 0925 602690/62907 for instant Access or Visa orders.

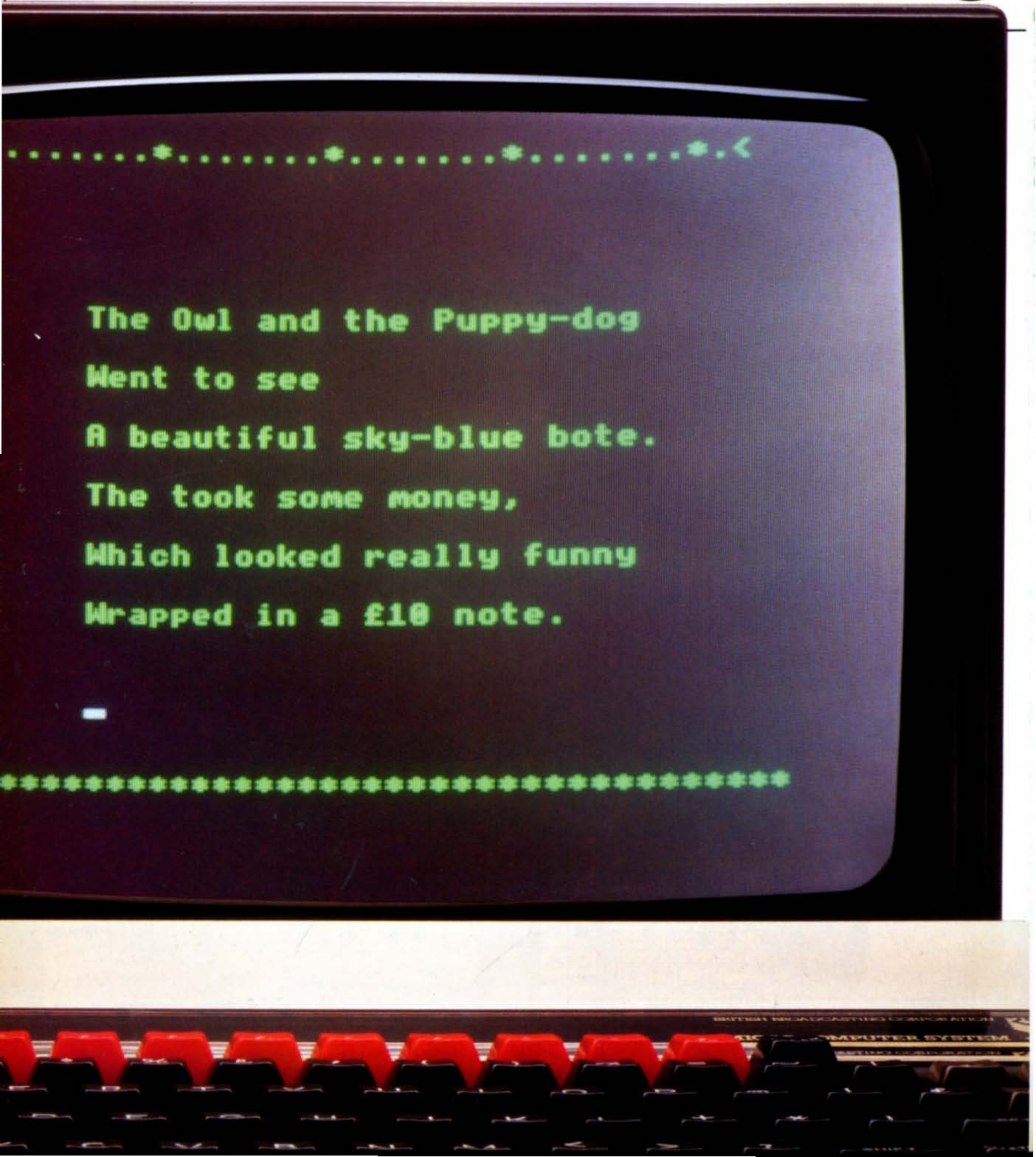
ArtworX graphics program



Please send No.________ **AMX Mouse** packages (including **ArtworX** and EPROM) at £89.95 inc. VAT and P&P.
I enclose a cheque/PO for £________ or debit my credit card.
Card No ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ ☐ Visa ☐ Access
Name ________________
Address ________________
Signature ____________ Date ________
(Please tick choice of media for **ArtworX**) ☐ Cassette ☐ 3" Disc ☐ 5¼" Disc

To: Advanced Memory Systems Ltd., Woodside Technology Centre, Green Lane, Appleton, Warrington, WA4 5NG, England.

How to become
before committing



```
.......*.......*.......*.......*.<



  The Owl and the Puppy-dog
  Went to see
  A beautiful sky-blue bote.
  The took some money,
  Which looked really funny
  Wrapped in a £10 note.


  ▬

************************************
```

a great writer yourself to paper.

It takes only two minutes and £59.80 to transform your BBC Micro into the heart of a word processor with VIEW from Acornsoft.

The VIEW word processing system is programmed into a single chip, a 16K plug-in ROM. Once it's installed into your BBC Micro – a simple job for your local dealer – you just switch on and VIEW is operating. (You can switch to other programs, like BASIC, with a single command.)

VIEW is a professional system, yet it's surprisingly straightforward to use.

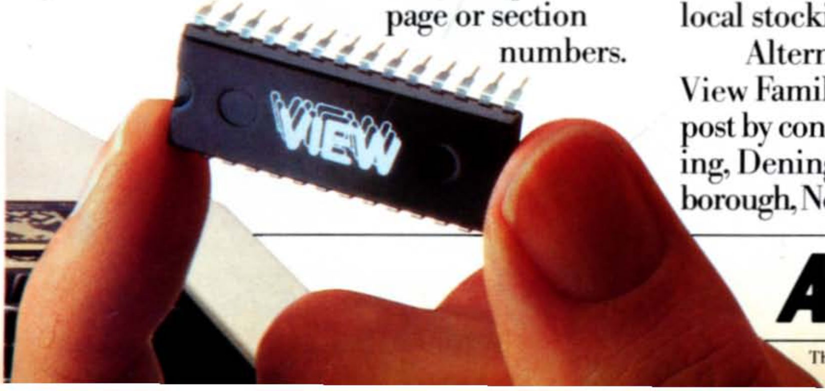
And it's so outstanding it's won the 1984 British Microcomputing Award for Home Software.

All you do is type out your text on the keyboard, and view it on the screen.

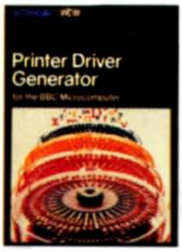
VIEW can search, change and replace particular words whenever they occur in your text. It can swap paragraphs. Automatically alter page numbers. Even count words.

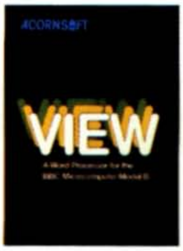
The possibilities are endless, because you can check, edit and change as much or as little as you like until you're satisfied. Then, with a single command, your final version will appear on the screen.

If you want to go even further, the simple addition of ViewIndex, just £14.95, means you can select and index words, complete with page or section numbers.



And of course, when you're ready, any printer that will operate with your BBC Micro will operate with VIEW. But if you want to use the printer's special facilities, such as bold printing or underlining, Acornsoft's Printer Driver Generator (£9.95 on cassette, £11.50 on disc) enables you to do so.





ACORNSOFT
HI-VIEW
A word processor for the BBC Microcomputer with the 6502 Second Processor

ViewIndex
for the BBC Microcomputer

For the more specialised user who wants to take advantage of the extra power offered by the 6502 Second Processor, Hi-VIEW (£59.80) provides 47K of text space in any of the BBC Micro's screen modes.

So whether you're composing a 300 page business document, a letter to the gas board, or a bit of Victorian nonsense, you can polish it to your heart's content, wasting precious little time. And even less paper.

You can get VIEW products from your Acorn dealer. Just phone 01-200 0200 for your local stockist.

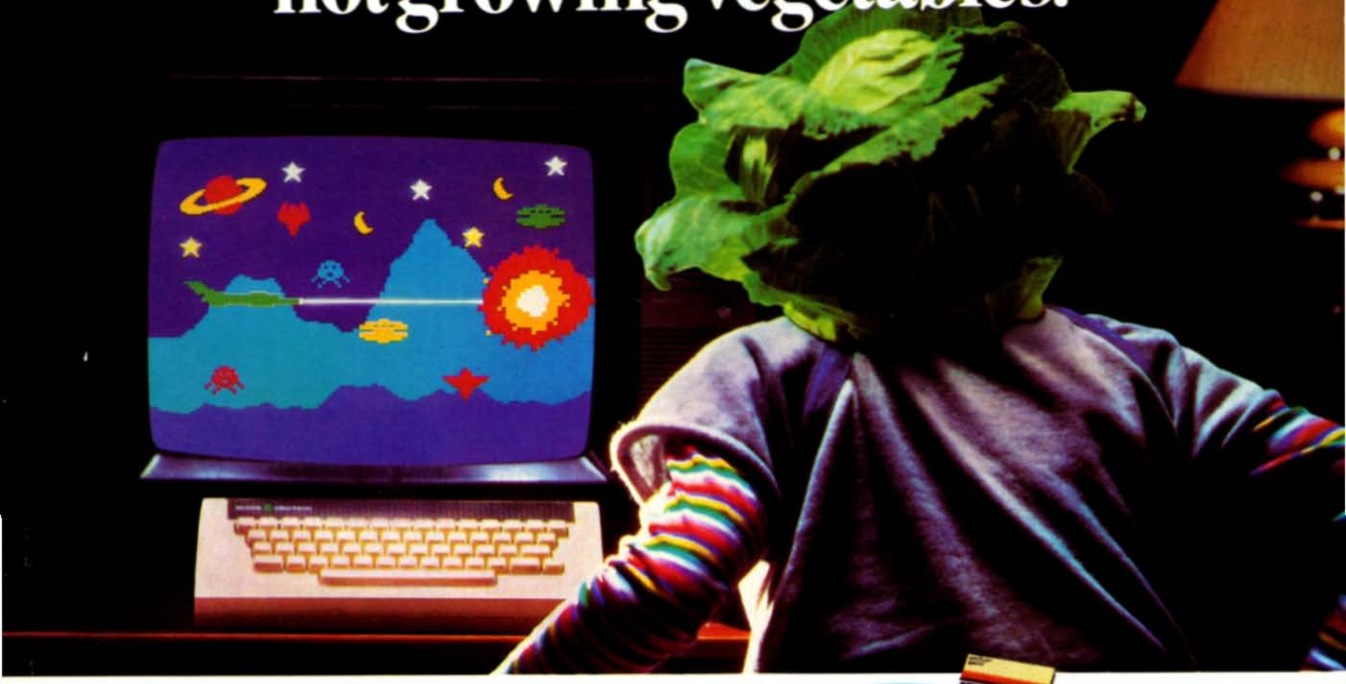
Alternatively, you can send off for the View Family brochure and order through the post by contacting Acornsoft, c/o Vector Marketing, Denington Industrial Estate, Wellingborough, Northants NN8 2RL. Tel: 0933 79300.

ACORNSOFT

The text on the screen is in Mode 6.

You bought a computer to cultivate your child's mind.

Make sure it's bearing fruit, not growing vegetables.



When it comes to developing a child's learning skills the computer's potential is endless.

Unfortunately, the search for software that makes the most of that potential has been endless too.

That is until Spinnaker created their remarkable Learning Tree Series, a unique software range that introduces the one thing missing from most educational programs – fun!

At Spinnaker educators and games programmers write our software.

It's a team effort that uses the understanding of how a child learns in a 'fun' way that makes children simply forget they're learning at all.

So successful is the Spinnaker formula that worldwide more parents buy more Spinnaker programs than any other home educational software.

And now, here in Britain, Spinnaker comes to the rescue of parents saddened by the mindless 'shoot to kill' software syllabus.

If you're looking for software that truly cultivates young minds look out for Spinnaker Learning Tree Series.

We're proud to say Spinnaker is one software house actually giving computer games a good name.

KINDER COMP

KINDERCOMP
is a collection of six fun learning games that help young children to improve their reading readiness and counting skills, as well as familiarising them with the keyboard.

MAKE-A-FACE
is a fun way for children to become comfortable with computer fundamentals such as menus, cursors, the return key, the space bar, simple programs, and graphics, and helps improve a child's memory and concentration.

KIDS ON KEYS
TREE

KIDS ON KEYS
Three exciting games that familiarise children with the computer keyboard as they learn to identify numbers, letters and words, and associate them with images they see on the screen.

Available from selected W.H.Smith, Claude Gill, Blackwells and all good software outlets. Most Spinnaker software is available for Commodore 64, Sinclair Spectrum 48K, Acorn Electron and BBC-B micros.

For further information contact Susan Hough,
W.H.S. Distributors, St. John's House, East Street, Leicester LE1 6NE Telephone: (0533) 551196.

SPINNAKER™
We make learning fun.

MIKE COOK'S PROBLEM PAGE

Help me get my auto fire back!

I RECENTLY acquired a Quickshot II joystick for my Beeb. To save money I decided to build the interface printed in the May 1983 issue of your brilliant magazine.

All went well until I tried to use the auto fire feature found on Quickshot II joysticks.

When it was engaged – by sliding a switch – there was an initial signal given out but afterwards all firing ceased.

I checked the circuit thoroughly and found no faults.

There also seems to be nothing wrong with the auto fire circuit on the joystick which I checked on a friend's interface.

Can you advise me so that I can regain use of the auto fire. – *I. Butt, Maidenhead, Berks.*

● My interface circuit was not designed to produce a continuous firing. It sounds like the "quick shot" joystick does this in the interface.

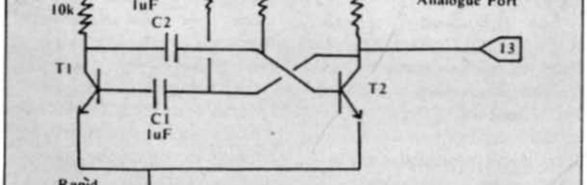
I really think it is cheating, but if you must, here is a circuit that will give you a rapid fire capacity.

It is a multivibrator circuit with values adjusted to give a short "press" of the fire button.

The mark-space ratio (the on to off time) can be altered simply by changing the ratio of the capacitors and resistors R1, R2.

The speed of firing can be altered by changing their absolute value. The components shown will give about five shots per second.

I have not tried it as I really think it is unfair on the poor aliens, but it should work.



Lost the video knack

AS well as a BBC Micro enthusiast I also tamper with home video movies – I find the BBC excellent for making the opening titles to my videos.

Although I have once successfully managed to record the results from my micro onto video tape, I cannot repeat the performance.

Originally I used the "RF out" lead from the BBC B into the "RF in" of the video, and by playing around with the "RF adjustment", I somehow managed to make the recording.

I now seem to have lost the knack – could you suggest anything? What channel does the BBC B transmit at? Maybe that will help.

I have also toyed with the video terminal of the BBC B but could only achieve black and white results, not very satisfactory. – *J.L. Kirkby, Leeds.*

● The BBC Micro outputs its RF at approximately channel 33. This can be adjusted by turning the slug accessed through the hole in the top of the UHF modulator.

By using this it may be "pulled" slightly. See page 103 of the September 1984 issue of *The Micro User* for full details of how to get colour from the video socket.

Making the connection

IS it possible to connect to *The Micro User* bulletin board using an acoustic coupler working on frequency shift keyed modulation and V24?

If not, why not?And if so what amendments are required to your program in the Beeb Body Building Course, July 84 issue of *The Micro User*. – *R. Hare, Arnold, Nottingham.*

● I am not sure what you mean. The modem was designed to work with the bulletin board and was tested on it. It uses V21 standard, V24 is not available using this modem chip and V24 is not frequency shift keying standard, but a voltage standard like RS232.

Price poser

I HAVE recently read your "Build Your Own Modem" feature in The July 1984 issue of *The Micro User* where you say the AM7910 modem chip is available for £32 in one-off quantities.

Can you please tell me where it is possible to get it for this price as the best price I can find is £44.95 from Maplin?

Could you also include in a future issue details of other bulletin boards and databases accessible to the general public? – *M.J. Oldfield, Axbridge, Somerset.*

● The price I quoted was a one-off trade price and excluded VAT. You will have to persuade a dealer to sell you one.

A black situation

LESS than two years ago I bought a BBC Model A micro. About 15 months ago I had it upgraded to full Model B status

→

You've got a problem with your micro and you just can't sort it out on your own? Then write to MIKE COOK. If he can't help then probably no one can . .

IF you have a technical query for this page, send it to Mike Cook, *The Micro User*, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 191.

From Page 71

by a competent electronics engineer.

The micro has a 0.10 ROM OS and an issue two PCB.

Recently, it has begun to malfunction. From time to time, it simply stops accepting any keyboard input, and the Break key is the only one which functions.

This trouble sometimes clears up after a short time, sometimes not.

The micro has been sent to a repair workshop three times. While in the workshop, the machine has always functioned perfectly.

On its latest visit the VIA chip was replaced. However, this has had no effect on the problem.

I would be very grateful if you could suggest a solution to this annoying problem. – *T.W. Johnston, Banbridge, Co. Down.*

● **As your micro is a very old type, it probably has the black power supply. These could not deliver the same amount of power as the newer ones and also run hotter.**

I suspect your problem is one of overheating and that in the workshop it is run with the lid off in readiness for the fault.

Perhaps the workshop is cooler than your house?

You could have a new power supply fitted or ensure that there is more ventilation.

Dragon disc on a BBC?

BEFORE I owned a BBC B Micro, I had a Dragon 32 with a Dragon Data disc drive.

Will this disc drive work with my BBC if I fit the disc interface kit?

If not, are there any modifications that will enable it to work? My knowledge of electronics is nil. – *C. Walters, Stokenchurch, Bucks.*

● **As far as I know there should be no problem in doing this. Remember you will need to make a new lead to cope with the sockets on the BBC Micro.**

A 'dumb' response

HAVING typed in your program to make the Beeb a "dumb" terminal I tried it – but sadly to no avail.

I have a Prism modem 1000 and, like many other people, I would like to get more out of it so I thought if I adjust the baud receive and send rates I could talk to Prestel using your program to have some fun.

As soon as I ran it I found some things about duplex, even and odd bits and stop bits of which I did not understand. I investigated your article still further and found that there was no relevant information – in my view probably not very accurate – about these points. Hence my letter.

I would be very grateful if you could send me some information about standards etc, plus any further reading you could suggest as I am confident in machine code and feel that with relevant information I too could begin to "hack" at home (fat chance you say). – *Liam Magee, Bryanston, Dorset.*

● **Prestel uses 1200 baud to send data and 75 baud to receive data from you. The tone standards are V23 and are different from those used on other bulletin boards.**

In addition Prestel uses seven data bits and even parity. Having set your micro to do that, you must then convert the codes characters you receive into the correct codes to drive the BBC Micro in Mode 7.

Although this is nearly similar there are many differences, especially in the way graphics are sent. Also double height characters are sent in a different manner to that required by Mode 7.

To confuse matters even more there is a problem with scrolling and wrapround. All in all, the software conversion is not trivial.

You can get the "spec sheets" from BT but they will charge you about £25. Alternatively there have been some articles in back issues of Wireless World. A lot of libraries stock them but you have to ask.

Are they corrupted?

IT'S loading problems again – the tapes causing trouble are:

☐ Bug-Byte – Galaxy Wars, which was OK until a month ago. Now I'm getting ?* etc. Block 7 etc. I wrote to Bug-Byte but correspondence returned marked gone away. They were in Liverpool, have they gone out of business?

☐ Bit Twiddlers' Killa upgrade – they kindly replaced my tape with one "recorded at a higher level" but they did say my tape was OK.

☐ Welcome tape is not stopping at each program but just rolling on.

I've cleaned the tape recorder etc (not demagnetised the head) and now many other commercial games are happy.

Interestingly a friend's back up tapes sometimes load and sometimes don't.

I think it must be the entry port on the Beeb, or my Benkson tape recorder – both only one year old – as I cannot really understand how the tapes have become corrupted and I have replaced the cable connecting the tape recorder/micro.

Any ideas please – before the machine goes to a repairer for a week or so and with no guarantee he will solve the problem. – *John Chambers, West Bridgford, Nottingham.*

PS. *OPT2,0 sometimes helps me load programs as well.

● **Tapes that used to load and now don't have usually been corrupted in some way. They could have been stored near a magnetic field – like close to a loudspeaker – or could have been damaged by dust.**

Also your record head could have become magnetised slightly, thus reducing the signal on some tapes.

Alternatively the tape head could have gone out of alignment since you first got the tapes. It is unlikely that your leads are at fault as the trouble is only with certain tapes.

A matter of lost nerve...

A FEW months ago I bought a Pace 100k single disc drive, and inside is a TEC FB501.

It has performed well except for one thing – it is incredibly noisy.

I understand that some disc drives are noisy because of the stepper motor used, but the rattle on this one is the worst I've come across.

When I phoned Pace about the problem, they said matters could be improved by changing some of the option links on the keyboard, namely making links 3 and 4.

The drive would then operate faster and the noise would be lessened – or just different.

So I duly obtained the necessary DIL switch, plugged in the soldering iron and got inside my Beeb.

Then I realised how horribly close the tracks were!

I lost my nerve as I have neither the necessary fine soldering iron nor the experience to risk it.

My question is this – is there some means via software to simulate the different link settings and hence test out whether this operation would in any case be worth it?

From the point of view of speed it is largely irrelevant, but the noise problem gets on my nerves. – *John Tissandier, Tiverton, Devon.*

● **Shame on you losing your nerve – the connectors are miles apart! You should see some real miniaturisation if you are scared of that. However, you could be trying to solder with a poker. If so, get a decent iron.**

The April 1983 issue of *The Micro User* contained my thoughts on that.

Fortunately to the rescue come those clever lads from Acorn who designed the operating system.

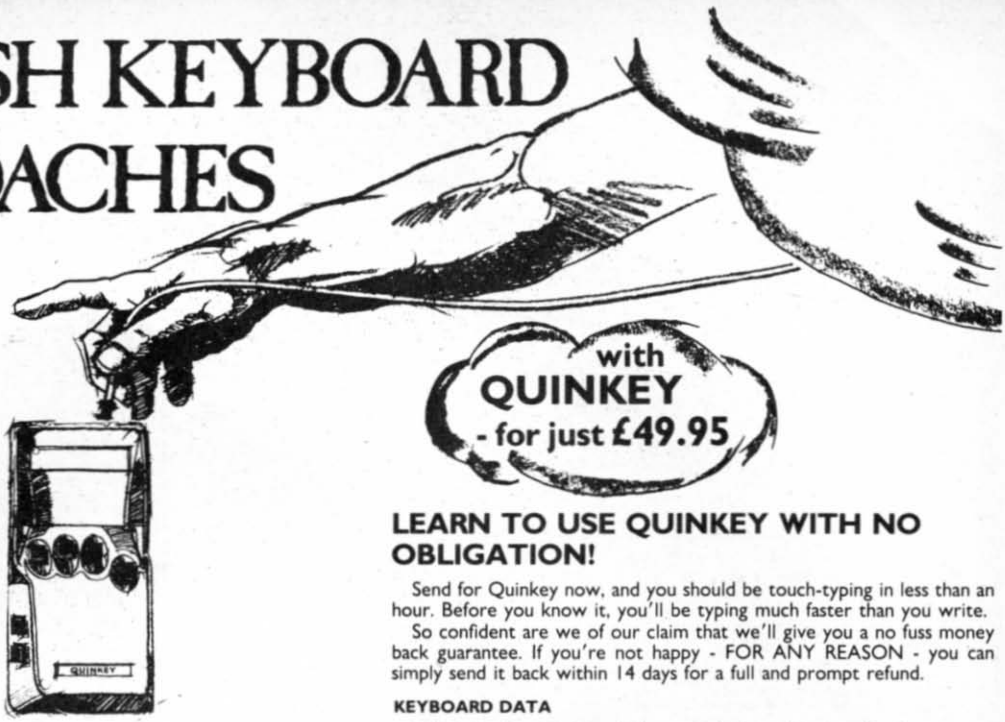
The command to try is: *FX255,X,207 where X represents the number made by links 5 and 4. The values to try are 0, 16, 32 and 48.

After this call you will have to press Break to initialise the new values.

If you are bothered by the noise it is obvious that you have never sat next to an Apple disc drive.

They get my vote for the most noisy discs of all.

BANISH KEYBOARD HEADACHES FOR EVER



THE REMEDY FOR "MICRO FATIGUE" - THE ONLY ALTERNATIVE FOR SERIOUS BBC USERS.

Having to face keying a lengthy piece of data is pretty daunting, but that's nothing compared to how you feel when you're only about a quarter the way in.

It's about then that eyestrain and headache combine to make you feel like the many-headed hydra, and the ache in your back makes you envy a packhorse.

And it's all because you're forced to "hunt and peck" amongst 74 keys on a keyboard that's over a hundred years old. Eyes torn between document and keyboard, up to the screen and back to the document - it's no wonder you're losing your place and errors and bugs start creeping in.

QUINKEY PUTS THE PLEASURE BACK INTO USING YOUR COMPUTER

- Quinkey is a keyboard which you simply plug into the analogue port of your BBC computer.
- You can be touch-typing in less than ONE hour. Quinkey uses the technique of Microwriting - practised by thousands of professionals in their working lives.
- Quinkey is operated with only one hand and comes with a long lead, so you can sit back and relax.
- Because you don't need to look at the keyboard - "hunt and peck" - your eyes are free to read data, either from screen or document - accuracy and speed become simple.
- With Quinkey there's no need to lose your place either - your other hand is free to follow data.
- Whether your work is with words or programs, Quinkey is a must. It can even double as a fast and accurate keypad for mass numeric data.

YOU'LL BE AMAZED AT WHAT YOU GET FOR £49.95

Quinkey is sold as a complete package ready to be used right away with your computer. Each pack for the BBC contains:

- Quinkey keyboard
- Interface and lead to analogue port of BBC
- Easy to follow self-teach guide
- "PROG" software (a utility program which interprets Quinkey signals to the BBC and gives you a comprehensive alternative/additional keyboard - all inputs except "Break". It merges easily with your application programs)
  "WP" enables you to fully use software such as "Wordwise", "View" and "Edword" for fast and accurate word-processing.

LEARN TO USE QUINKEY WITH NO OBLIGATION!

Send for Quinkey now, and you should be touch-typing in less than an hour. Before you know it, you'll be typing much faster than you write.

So confident are we of our claim that we'll give you a no fuss money back guarantee. If you're not happy - FOR ANY REASON - you can simply send it back within 14 days for a full and prompt refund.

KEYBOARD DATA

Quinkey has five main keys which are pressed in combinations. Signals are sent on release of keys. With the addition of the control key Quinkey takes over all inputs except "break" from the BBC keyboard or can be used in conjunction.

Quinkey casing is made from sturdy FR ABS. Professional quality keys and gold cross point microswitches will give heavy-duty performance.

SOFTWARE DATA

When invoked using CHAIN "WP" or CHAIN "PROG", loads at the current PAGE value and moves PAGE up by 768 bytes. No zero-page locations required. Interrupt service vector IRQ2V, correctly chained. PROG may be incorporated into users' programs without difficulty.

INTERFACE DATA

Quinkey's interface to the analogue port of the BBC is a four-channel connector which allows up to four Quinkeys to be used simultaneously with one micro. (For further information about the Educational Pack of four Quinkeys and schools software, tick the appropriate box in coupon)

TESTED COMPATIBILITY

BBC model "B" OS 1.2 BASIC I or BASIC II (unless using INKEY with negative argument), DFS 0.90. View A1.4, Wordwise 1·17, Edword.

FOR COMPREHENSIVE REVIEW OF QUINKEY SEE ACORN USER, SEPT '84

Send the coupon now to take advantage of our special money-back guarantee!

Microwriter Ltd, 31 Southampton Row
London WC1B 5HJ Tel: 01-831 6801

microwriter
QUINKEY To: Microwriter Ltd., 31 Southampton Row,
London WC1B 5HJ

I would like to take advantage of your special money-back guarantee and realise that I can return the pack(s) undamaged within two weeks of delivery if I am not fully satisfied for a complete refund.

Please send: ....Quinkey pack(s) @ £49.95 (plus £2.50 p&p) £........
........More information about the educational pack of 4 Quinkeys and software for schools.

I enclose a cheque made payable to: "Vector Marketing/Microwriter Ltd." for £................ or debit my Visa/Access credit card No...........................

Signed..

Name..

Address..

....

....

Please allow up to 28 days for delivery. Reg. no. 137 4069 MU11

Electronequip

(Authorised BBC Micro Dealer, and Econet service centre)

NEW View Printer Driver

For FX-80, Juki Brother HR15 and Kaga/Taxan 40/80T Disc

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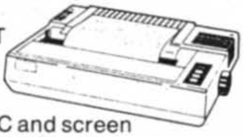

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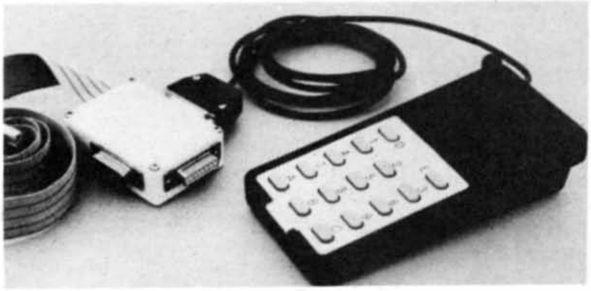

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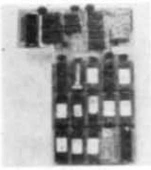

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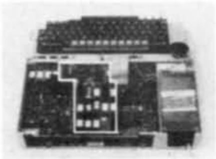

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Choose chunky

Use teletext pixels to build up characters in

IN the May 1984 issue of *The Micro User*, an article appeared on how to produce multi-sized characters in Modes 0 to 6.

Just to be fair to Mode 7, here is a teletext chunky letter printer, which uses the teletext Pixels to build up the characters. It will allow you to print big letters in any colour using contiguous or separated graphic blocks.

If you type in the listing leave out lines 10 to 170 if you feel lazy. The micro will print the letters BBC diagonally across the screen in various colours, in alternating contiguous and separated graphics. It will then do a very quick portrait of me!

The printing itself is instantaneous since direct access is made to the screen and ROM/RAM character definitions.

The procedure is in lines 1620 to 1690 in the listing. It puts various parameters into the memory for the machine code to use, and then calls the code. To call the procedure, the syntax is:

```
PROCPrint(colour ,separation ,X start
Pos ,Y start Pos , "TEXT")
```

The colour is a number between 1 and 7 using the standard colours. The separation parameter should be 0 or 1 – 1 will give separated graphics, 0 will give contiguous graphics.

The X and Y start positions are the standard X, Y positions as found in Mode 7.

Note that printing will start one column to the right of the specified Y coordinate because the micro will insert the correct graphic control code in front of the graphic blocks.

If you select separated graphics, it will start yet one more position to the right so that it can insert a separated graphic character.

The text can be any letter(s) or user defined character(s), but two points must be made.

☐ If you type in more than there is room for on a single line, the printing will wrap around, causing the graphic control codes and other graphics to be overwritten.

☐ All standard characters from 32 to 126 can be printed. However, user characters are slightly different. All user defined graphic codes are between 128 and 255, which means that there are a possible 128 graphics.

In practice, if you have not exploded the character set using *FX20 you can only define 32 different blocks, so all the graphics are repeated four times at intervals of 32.

So CHR$(128) = CHR$(128+32) = CHR$(128+32+32) = CHR$(128+32+32+32). Because of the way the routine works, you can access all the UDGs but you must use the lowest possible code, which will be between 128 and 159 inclusive.

In lines 1560 to 1580, character 128 is used. If you were in Mode 2 CHR$(128), CHR$(160), CHR$(192) and CHR$(224) would all produce a little man, but the teletext print routine will work only with CHR$(128).

If you have exploded the character set, the routine can only access CHR$(128) to CHR$(159).

To clear any confusion, here are two examples:

The format to print 'Hello' starting at (0,4) in separated red would be:

```
PROCPrint(1,1,0,4,"Hello")
```

The format to print 'BBC' and the user defined graphic with code 226 starting at (2,3) in contiguous blue would be:

```
PROCPrint(4,0,2,3,"BBC"+CHR$(130))
```

"BBC"+CHR$(130) will pass a string consisting of the letters B, B, C and the character with code 130. Notice that the code of the UDG was between 128 and 159. (226-32-32-32=130).

The procedure does not check that the parameters passed to it are valid. For example it will try using colour 101 if you pass the colour as 101. Checking could be included, but if you are sure that only valid numbers are passed, it would only be a waste of time.

Because the C%, S%, X%, Y%, and M$ are in the brackets after DEF PROCprint, they will not affect variables of the same name elsewhere in the program. These are called local variables and are described more fully on page 230 of the User Guide.

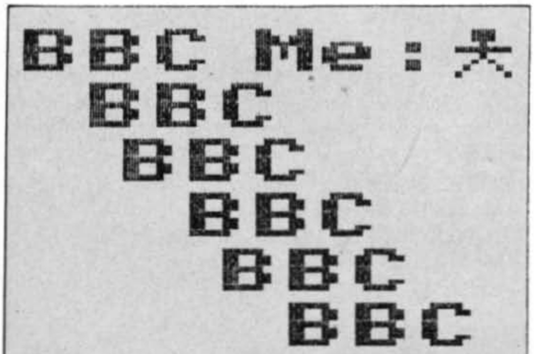
The routine can calculate the (X,Y) position correctly only if the screen has not been scrolled. Otherwise, it will work, but the text will not appear at the desired (X,Y) position.

To get the machine code into your program you can either type in lines 190 to 1520 into every program that you want big letters – but not necessarily with those line numbers – or you can save the assembled machine code only. You will have to type in lines 190 to 1520 and run.

To save the code type:

```
*SAVE "BIGLETTERS" 900 9CE
```

and to load it back into the program



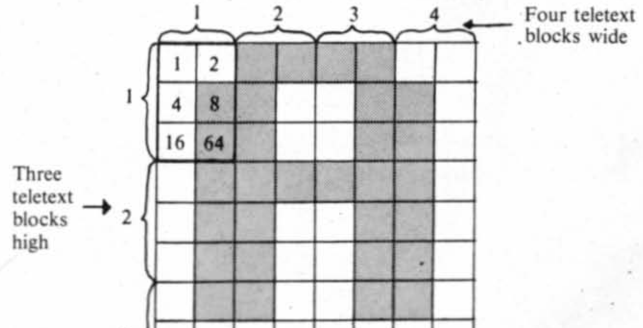


Figure I: Enlarged teletext 'A'.

mode 7 letters

this program by CHRISTOPHER STOPS

requiring it type:

`*LOAD "BIGLETTERS"`

Note that because of where the code lives, it will be destroyed if cassette filing (not saving and loading) or envelopes with numbers 5 to 15 are used.

Addresses &A00 onwards are used as a text buffer, the text being placed there by line 1670.

Figure I shows how the first teletext block for the letter 'A' is calculated, with the teletext pixel values for that block also shown (see page 155 of the User Guide).

The first row is shifted left, so the top left pixel will be put into the carry flag. The accumulator is then rotated right, the pixel now being in bit 7 of the accumulator.

This is repeated, the second pixel of the top row now being moved out, and into the accumulator. The second row is then acted upon in the same way.

In the third row, the first bit is transferred. Now in the teletext pixel values, there is no pixel with value 32, so an extra 0 is shifted into the A register in line 1240. The pixel with value 64 is shifted and rotated next.

Then in line 1270, an extra 0 is shifted into the accumulator again, because there is no pixel with value 128.

By now we have done seven shifts and rotations since the first one, which means the first pixel which had value 1 and was put into bit 7 of the accumulator has now reached the 'units' bit of the accumulator.

In fact they have all reached their correct place. In addition, 160 has to be added to the result (lines 1280 to 1290). Then at line 1300, the teletext pixel is finally put on the screen.

This has to be repeated for four teletext blocks across the character, and for three blocks down.

In the specific case of the first block for 'A' shown above, the accumulator will end up with ones in the eights and sixty-fours columns. Add on the 160, which gives CHR$(232).

Check it on page 489 of the User Guide.

STRUCTURE

Lines	
290-450	Calculate at what address on the screen the position (X,Y) is, using the formula X+40*Y+&7C00. The routine does the multiplication by continuous adding of 40 for Y times. Because of the way the loop is constructed, if Y originally contained 0, the loop will not repeat 256 times which is what happens in badly constructed loops. The resulting address is put into locations &81 and &82.
460-560	Insert the necessary graphic codes, and increment the screen poking address to allow for the insertion.
570-700	Similar to above for separated graphic control codes, if required.
710-720	Reset the current letter pointer to the first letter.
760-860	Access the current letter. If it is a carriage return, all the letters have been processed and a return to the OS is made.
740-750	Set up a constant which will be needed later.
790-820	If the character accessed was negative in two's complement, it therefore had a code between 128 and 255, indicating a user defined graphic. The action in this case is to change the constant. The ROM address of the character definition is calculated, from the formula (ASC '?'-32)*8, where '?' is any character from CHR$(32) onwards. To this must be added a constant, because standard characters start at &C000 and UDGs start at &C00. The constant was in fact found earlier, and is now used to calculate the final ROM or RAM address.
1020-1070	Copy the eight bytes of the definition into the RAM, where they can then have rotations done on them. Two bits out of three lines of definition are shifted out at a time, so that a complete two across by three down teletext block is computed each time.
1140-1270	Do the above. A slight problem occurs because the teletext block graphics which are three pixels high will not exactly divide into the vertical eight pixels of a character definition. This is solved by having a dummy ninth row of definition as zero, inserted at lines 240 to 250.

The above rotations are repeated four times for each triple row of character definition. The triple row handling is repeated three times per character. The whole lot, ROM address calculations and all, is repeated for each letter. Just like nested loops in fact, and the 6502 does it all in split milliseconds!

Teletext listing

```
   10 REM ********************
   20 REM * TELETEXT LETTERS *
   30 REM *  (c) Micro User   *
   40 REM ********************
   50 REM
   60 REM &70-&71=TEXT ADDRESS
   70 REM &72    =CURRENT LETTER
   80 REM &73-&74=ROM ADDRESS
   90 REM &75-&7C=CHAR DEFINITION
  100 REM &7D    =ZERO FOR CHAR 9TH R
OW
  110 REM &7E    =GRAPHICS COLOUR
  120 REM &7F    =SEPARATED/NOT
  130 REM &80    =CURRENT TELETEXT BL
OCK
  140 REM &81-&82=SCREEN POKEING ADDR
ESS
  150 REM &83-&84=STARTING X/Y POS
  160 REM &85    =UDG FLAG/ADDER
  170 REM
  180 MODE 7:VDU23;8202;0;0;0;
  190 FOR Q%=0 TO 2 STEP 2
  200 P%=&900
```

Turn to Page 177

ChipChat
Modem

ChipChat modems are the most versatile and up to date available at the price. With autoanswer as standard and intelligent autodial with speed conversion as an option, **ChipChats** may be used to access computers and databases such as Prestel, Micronet, Homelink and BT Gold.

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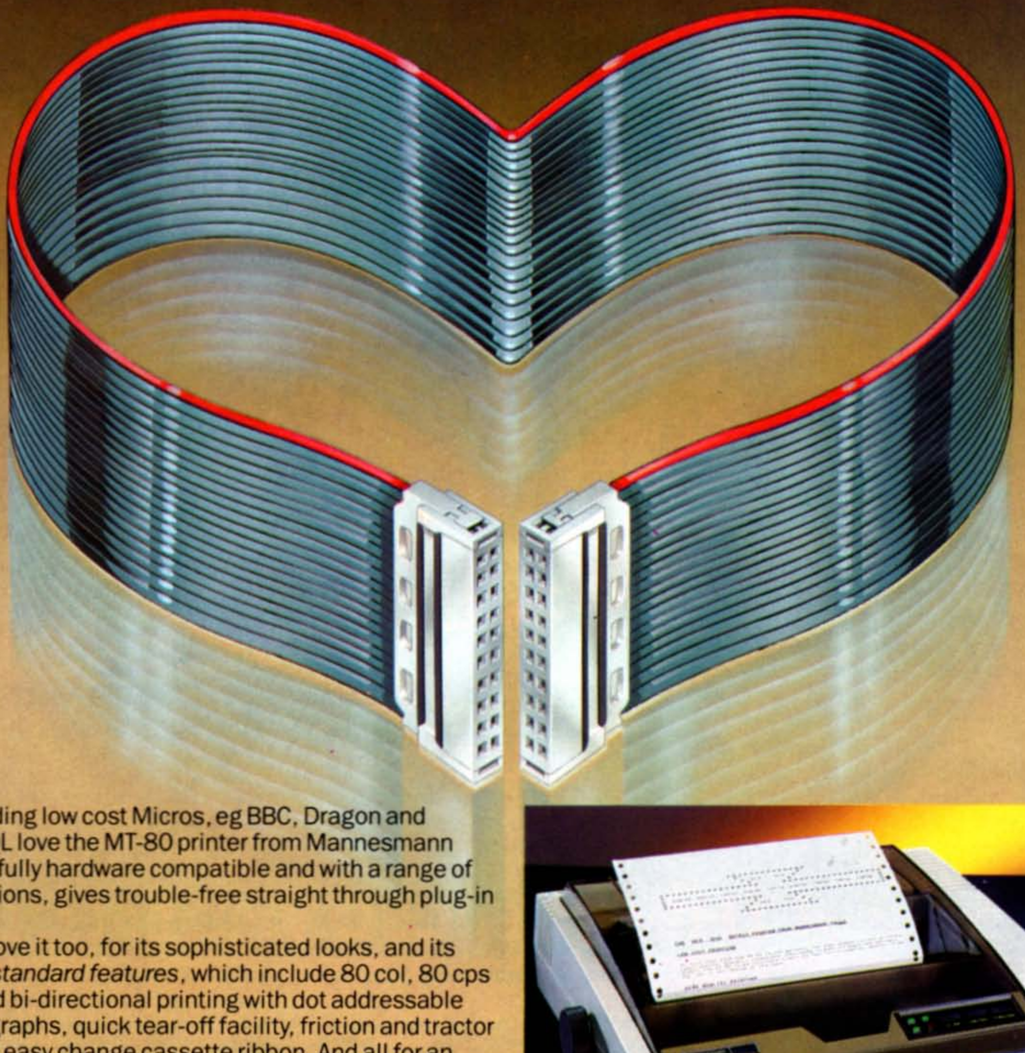

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Have I ever played an adventure? Well, I've 'cheated' a bit..

Alice through the VDU

Our monthly foray into Adventure games

THE Adventures of Tintin by Herge are as French as an empty packet of Gitanes in the dust. But he travels well, and first appeared in English in the Eagle comic of the early 1950s.

Actually they only ran one story – King Ottokar's Sceptre – but I became a Tintin *fin* and, when I lived in Paris, I read all his adventures in the original, usually browsing in a drug store on the Champs Ellises near the Place de Toilet.

I recently visited France to do research for this article – that is, browse through the French micro magazines and books.

There are now about six magazines compared to two last year, but they are still pathetic. Most of the hardware is American and all the programs are Basic with French variables.

Thanks to the French wasting their money on food, drink and holidays we have, as usual, a comfortable lead over them where it really counts plus, because we speak English, we gather more easily the crumbs from the American table and 'Sayonara' to IBM is still a long way off.

However the French do intend to catch up and they will. Tintin was only just behind Dan Dare into space. But of the seven adventures I saw reviewed in French, only one of them was IN French.

Surely they can do better than that. And it's about time the Germans came out with The Ring of the Nibelungen by Wagner.

Now there's a real hero. Just imagine the Valkyries coming in to pick up the pieces when you've fouled up. And as for Siegfried's funeral music – the Hobbit was an (intended) joke in comparison, a bit of British whimsy.

In the meantime, it's obvious that an adventure in a foreign language could be more educational than most of the rubbish on the market. I don't just mean yet another variation of Space Invaders, but software that claims to teach you French by poisoning fish and so on.

Why the French, or anybody for that matter, aren't pirating adventures is just as baffling to me as why people spend the money, time and trouble to play them.

Few people approve of pirates, but they have been around since before Asterix so I have no sympathy for companies who blame their problems on the copying of software. A lot of this is free advertising for the company to people who would never have bought the full price original.

I'm in a forthright mood because I received the following from Simon Clarke president of the International Adventure Club – I thought adventurers were loners and hated being organised, still . . .

Dear Whatever the hell your name is, just one question – have you ever played an adventure?

Let me explain a few economic facts of life to the president. I receive about five games a month to review. The senders want me to say something funny, clever and appreciative about their funny, clever and dirt-cheap game *as quickly as possible.*

I could ask any of them to send me a complete solution and most of them would, but that would be cheating so I "cheat". That is, I do what most readers could easily learn to do themselves.

Of course I have the advantage of a printer so if I can get a listing, I solve as much as possible on the train to work. This also saves me buying The Times just for the crossword and cheating with a dictionary or Thesaurus.

In similar vein, Peter Killworth, author of Philosophers Quest, Castle of Riddles and Countdown to Doom – so ask *him* not me – took umbrage at my telling you how to list the messages in his games because he thought this spoilt the entertainment.

The fact is I don't care what people do with what they buy so long as they do it quietly.

Actually I thought I was doing Peter a favour because people write to me saying they have bought one of his games (still among the best), got hopelessly stuck and swear they'll never buy another unless I (why me?) help them.

By the way, I'm not answering any

more letters that are not accompanied by SAEs.

Funny thing is that I also got a letter from a vicar telling me how to break a game – "Just the sort of stuff you'd need for a review!"

In fact I got a lot of thanks for that particular hint, and R.W. Crisp even sent me a tape, called Reveal, to break Sphinx Adventure. I appreciate the thought, but I had done that one (see the January issue).

Next month I will deal with some of the ways to protect a game but, briefly, the only two ways to protect Basic games are either that the answers are not in the program, or all the messages, etc, are encoded on a disc and are too much trouble to decode, meaning it's simpler to play the game than break it.

Having been away, the games have piled up. My apologies to Epic who sent me three games months ago – they were Castle Frankenstein, Quest for the Holy Grail (it's somewhere in Sheffield I think) and Kingdom of Klein.

I groaned when I got them – I can write a whole article on just *one* game and I obviously had to solve all three together, but they were in machine code and all have more than 220 rooms.

Peeking revealed lots of mazes, roughly 80 verbs, 60 objects and some "dropped pearls" which are always difficult to sort out even with a listing.

They also have the cheek to respond to HELP with: "Try thinking a bit harder, everything is logical". Then they expect me to think that a flying broomstick is logical. Mr Spock might agree it is predictable, but it is not logical.

Did you know that carpets can fly? Kingdom of Klein doesn't even know what a carpet is, so why should I assume it knows what a portrait is?

If you play fair, you have to keep trying to get any object mentioned until you get an encouraging response like: "You can't do that yet", rather than: "I don't know what a KNOTTED is".

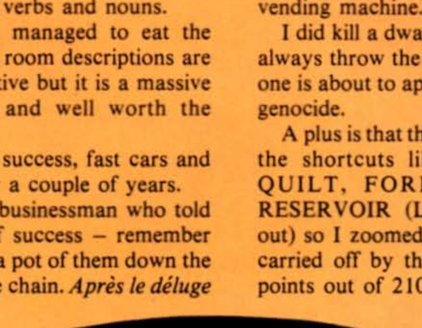
Anyway I'd barely picked up the umbrella in Kingdom – which doesn't belong to me – when, I assume, the owner searched my office and took all the tapes plus The Hobbit and Pimania (Melbourne please note – I have really missed The Hobbit).

However Merlin was doing a grand job on the Epics so I thought I was off the hook, but then The Wheel of Fortune rolled in followed by a complete set of messages, verbs and nouns.

I still haven't managed to eat the matches and the room descriptions are somewhat repetitive but it is a massive complex game and well worth the money.

Epic deserves success, fast cars and bankruptcy after a couple of years.

I once met a businessman who told me the secret of success – remember tealeaves? Pour a pot of them down the toilet and pull the chain. *Après le déluge* there is always just one leaf left floating in the pan – that's success.



```
I don't know
what a knotted
is.
```

For a fee I'll even tell Epic the secret of peace and tranquility, which is also the reason I'll never be president of anything.

I've now had new improved copies of the stolen Epic games. They load to Fingal's Cave by Mendelssohn, not *Gudonov* because Castle Frankenstein really needs Night on a Bare Mountain by Mussorgsky, but at £8 each they are all good value.

No hints, *right* to EPIC if you get stuck or critical as they deal exclusively with games for the BBC and take care that the messages are spelt *write*. A professional product and company.

The next game is Classic by Melbourne. Now I know Colossal Cave like the back of my hand, so no perspiration but the pirate must be on holiday (a summer cruise?) and the dwarves are notably rather subdued with only one axe between the lot of them.

Also the snake is no longer a pushover but there are a few bugs with the bird in the cage – try: DROP CAGE.GET CAGE. LOOK and you'll see what I mean.

I dropped the bottle at the giant's door – as usual – and then found it was empty and the ground was wet at the vending machine.

I did kill a dwarf but that's because I always throw the axe down just in case one is about to appear – it seemed to be genocide.

A plus is that the program includes all the shortcuts like SECRET, BEDQUILT, FORK, BARREN and RESERVOIR (Level 9 missed them out) so I zoomed round and was soon carried off by the elves but only 140 points out of 210, and nowt for Witts End, so even if you've played the original this is still worth the £7 – a price that is as amazing as how to kill dragons.

If you haven't solved Colossal or The Hobbit or Scott Adams' Pirate and Adventureland and want to ruin the entertainment – it's your money – then get Mike and Peter Gerrard's book, "The Adventurers Companion".

Their justification is that if the authors don't publish a solution then somebody has to cut the divorce rate.

Of course, that someone is going to make errors – even the authors overlook some solutions and Edsgar is still trying to write the perfect program – so the red herrings of the rod and the vending machine are both described with no comment on the time wasted.

The book is written in an amusing way but I wouldn't have included a single Scott Adams game let alone two. And the solution to The Hobbit has already appeared. So five out of six for presentation but only two for content.

You may have noticed that in my review of The Hobbit I made some guesses. For example I knew that Thorin could carry Bilbo.

Reading the solutions I find the

From Page 81

ending rather disappointing – surely Bilbo and Thorin should get to Smaug, then Thorin acts as decoy while Bilbo steals the treasure and gets chased back to Laketown. Not quite like the book, but Bilbo has to be on the scene when Bard goes into action.

It's inconsistent that Bilbo can carry Bard, who must be a lot bigger than Thorin, and nonsense to allow him to climb with such a burden.

One for the family

THE Mystery of the Java Star by Shards Software is an unusual game in four parts (only four?). You have to recover the gold and the Java Star – a ruby – from a shipwreck somewhere in the South Atlantic.

In the first part you choose one of three levels of difficulty which gives you either £12,000, £8,000 or £4,000 to play with. You must then piece together some "scraps of paper" (a 6*7 matrix) to make a map and a message. This part is quite clever because they vary each time you play.

In the second part you have to visit places in London to get further information and funding. There is a choice of 31 places and it takes a while to pick out the relevant ones.

Fleet Street is particularly good – I sold my story so many times I hardly needed to find the treasure.

To finish this section you have to answer the same five questions – a pity because this could have been randomised.

In the third part you have to locate the correct island. In the fourth you must dive, in real time, to recover the treasures, and then you have to solve the mystery of the ruby. Rather like Eskimo sculpture, it's meant to be felt rather than seen.

Some nice pictures, music ("We are sailing", "If I were a rich man") and probably best played as a group or family. But not "educational".

Political applications

HOW many cats know that a Purdy is a double barrelled shotgun? But why capital "P" – does Dennis also play around with a Mashie Niblick at the 19th?

Dennis Through the Drinking Glass by Applications Software is as close to libel as Casanova's parrot was to slander.

It's not fair because the Editor won't let me make political jokes and chopped a puzzle that barely mentioned the blessed Margaret. Actually I've never voted *****, probably because I'm only seven years old.

Now I'm all for women in power, particularly Ministeras Primas, but two things I can't abide are intolerance and inebriation.

I think you should get a licence to drink OR drive every year. If people want to disconnect their brain cells in private that's their choice but I've had my car bashed too many times to think drinking is funny.

Enough *matronising,* in this game you can get stuck into the Tory's greatest assets – Tony Benn, along with Norman Rabbit – don't turn into a lettuce leaf when he's around – and good old Ken Livingstone. Such a nice smile.

Your objective is to avoid Maggie and get to the pub for a clinker before closing time. The messages are in doggeral and quite amusing. If you get caught then, as an old American friend used to say, "You're *** is grass and I'm the lawnmower".

Not a real adventure, but amusing and quite educational.

Actually, the funniest thing I've seen recently was somebody asking how to open the Snowball security door. Morris Minor replied: "Hit Nightingale with spanner. Take syringe. Prise door open with syringe". and here's me thinking I could use a screwdriver when really it's the other crew member who needs a drink.

Have flair with Lair

THE Lair by Utopia doesn't work so have a look.

It says CHAIN "LAIR" and then finds 30 sections called FLAIR. So fix that – good job I don't actually *play* these games – and decide that I want to be a Priestess rather than a Warrior, Elf or Pillock and set Strength 100, Skill out of sight, Magic 32000, Gold 1000000, Rations 0 (must watch my figure) and Experience infinite.

You can go N, S, E, W, eat rations, store position and respond to prompts like: 'You can see an awkward Orc. Do you wish to bribe him?" Orcs usually take your money – even when you bribe them with nothing – and combat ensues.

Of course I beat the tar out of everything in the caves – there are about 20 different creatures – and as for the Mightly Sorcerer, I just brushed him aside, though he is a tricky bird.

The 200 rooms are exceedingly dull with just the occasional pit to avoid and the usual Funeral March if you don't.

Obviously based on the "Warlock of Firetop Mountain" it barely captures the spirit – no puzzles, no room descriptions and no particular objective.

Far better is Swords-Sorcery by Kansas but only if you like D&D battling.

I know Don Quixote thought that randomness was the essence of adventure but I quickly get bored with bribing, bashing and bumping around mazes with a set of feeble, bumbling wierdos.

Still everyone *a son gout* and the map is a nice idea.

Talking about gout, did you know that the French refer to the GB cars as *Gorge de bois?* that is wooden throat, meaning boozer, meaning keep clear!

☆ ☆ ☆

SEA Adventure by Virgin is quite the opposite of educational. There are only 10 commands, all done with the *f* keys. So "no more typing degrees required to play this game!"

The author is an amateur who probably thinks Chomsky 2 is a dog food and that Hash Tables are found in Wimpey bars.

A five year old could solve this and then probably find learning to type more interesting.

☆ ☆ ☆

ONLY one solution to Quasimodo's problem in the August issue of *The Micro User*.

Line 40 should have been:

```
40 N= 2 + RND(8)
```

which the solution has pointed out. Answer next month.

No answers to the Filthy Fifteen in last month's issue. Note that line 200 needs:

```
: P(Y,Z) = 1
```

concatenated.

Alice

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By EVAN VENN

DUEL isn't the most original game we've ever published. How could it be, since it's based on one of the most popular arcade games ever?

We can guarantee, however, that it's one of the most compulsive, intriguing, addictive and infuriating games ever to appear in *The Micro User*.

It's for two players, and don't play it with people you want to stay friends with – or married to. Heaven knows what would happen if poor old Bob could entice Andrea into a game . . .

The scenario couldn't be simpler – both you and your opponent must move round a rectangular board. But as you do so, you leave a deadly ion trail.

You must avoid both your own and your opponent's trail in order to survive. Hitting the surrounding wall is just as fatal.

Subtlety is not Duel's strong point. The survivor wins the round, and the first to victory in 10 such combats wins the game.

On running Duel you will be asked if you intend to use the keyboard or games paddles. Press P for paddles and K for keyboard. Similarly, S for sound and Q for quiet.

Player No.1 appears on the left with a red ion trail. His keys are:

Q *Up*
X *Left* **C** *Right*
A *down*

Player No.2 appears on the right with a green ion trail. His keys are:

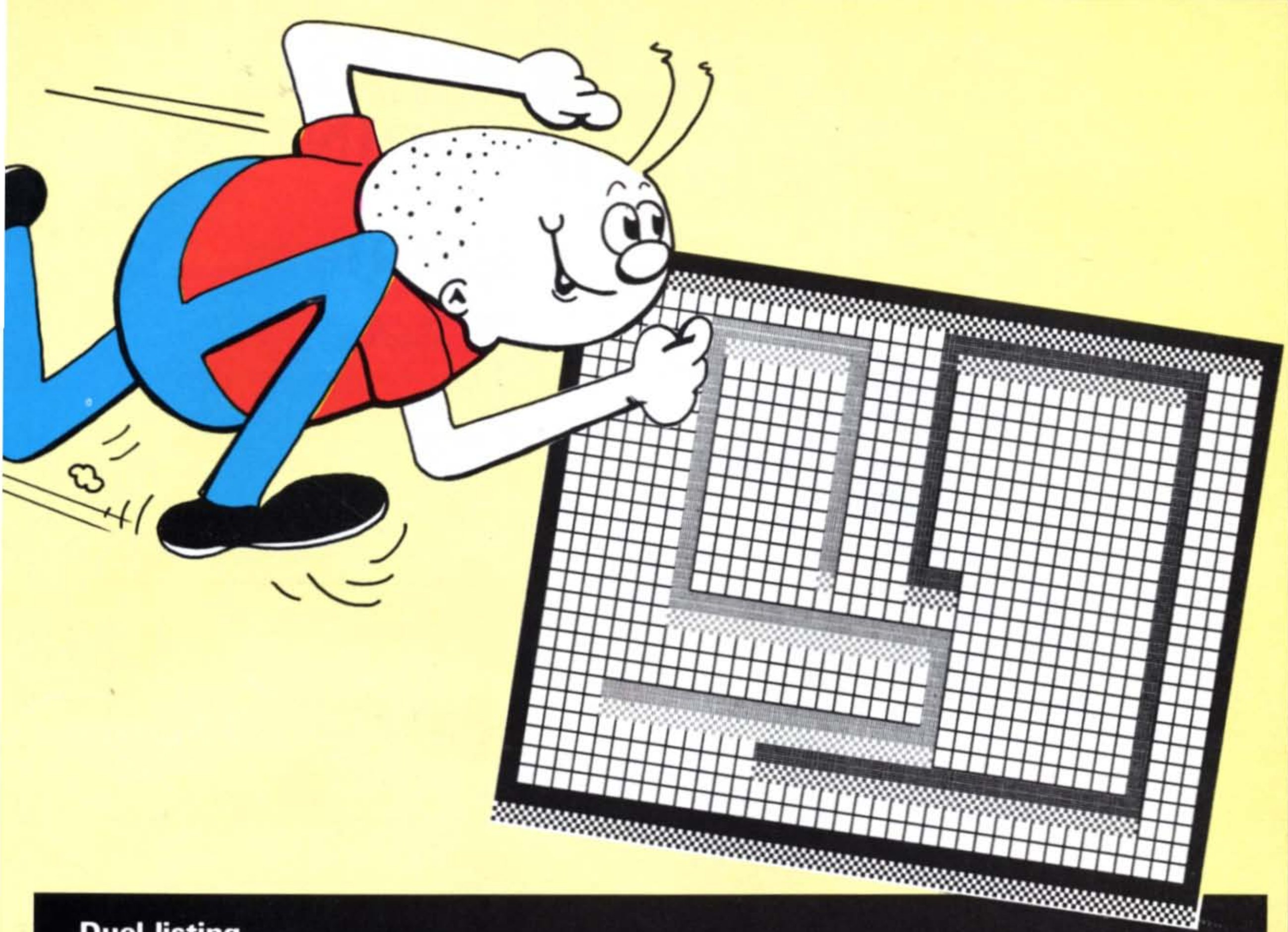
[*Up*
< *Left* > *Right*
* *Down*

At the end of each combat the scores are displayed and the loser's ion trail flashes.

If things get too dire, pressing Break will take you back to the start of a new game. But don't expect your opponent to be too happy about that . . .

PROCEDURES AND FUNCTIONS

PROCgo	Main loop. Program alternates between right and left player until a crash occurs.
PROCleft	Left player. Main routine – checks paddles, keyboard, reads character, prints characters, makes sound and finally checks for crash.
PROCright	Right player. Main routine – checks paddles, keyboard, reads character, prints characters, makes sound, finally checks for crash.
FNpaddles(P%,OD%)	Reads paddle status. P% indicates paddles number and OD% indicates old paddle direction.
FNboardR(OD%)	Reads keyboard status for right player and OD% indicates old keyboard direction.
FNboardL(OD%)	Reads keyboard status for left player and OD% indicates old keyboard direction.
PROCreadch(H%,V%)	Reads screen for character.
PROCgraphics	Sets VDU 23s and scores to zero.
PROCleftcrash	Left player crash. Increments other player's score, makes screen flash and checks for winner.
PROCrightcrash	Right player crash. Increments other player's score, makes screen flash and checks for winner.
PROCgrid	Using character graphics draws grid, sets positions and direction of players.
PROCscore	Prints scores.
PROCwinner	Prints which player has won.
PROCsound	Sound.
PROCinstruct	Prints instructions.
PROCbar	Waits for space bar to be hit.



Duel listing

```
  10 REM ***************
  20 REM (C) Micro User
  30 REM ***************
  40 *KEY 10 OLD¦MRUN¦M
  50 PROCgraphics
  60 MODE1:PROCinstruct
  70 ONERRORGOTO90
  80 REPEAT
  90 leftcrash=FALSE:rightcrash=FALSE
 100 PROCgrid
 110 IFsound=1 PROCsound
 120 IF(RND<.5) PROCright
 130 REPEAT
 140 PROCgo
 150 UNTIL leftcrash OR rightcrash
 160 IF leftcrash PROCleftcrash
 170 IF rightcrash PROCrightcrash
 180 UNTILFALSE
 190 END
 200 REM*************************
 210 DEFPROCgo
 220 PROCleft:IF leftcrash ENDPROC
 230 PROCright:IF rightcrash ENDPROC
 240 ENDPROC
 250 REM*************************
 260 DEFPROCleft
  270 IFboard L%=FNboardL(L%) ELSE L%
=FNpaddles(1,L%)
  280 X%=X%+(L%=4)-(L%=2):Y%=Y%+(L%=1
)-(L%=3)
  290 PROCreadch(X%,Y%)
  300 VDU19,1,1,0,0,0,17,1,31,X%,Y%,2
26
  310 IFS%=8THENVDU31,X%,Y%+1,224
  320 SOUND0,-15,10,sound
  330 IFT%=15 leftcrash=TRUE
  340 ENDPROC
  350 REM*************************
  360 DEFPROCright
  370 IFboard R%=FNboardR(R%) ELSE R%
=FNpaddles(3,R%)
  380 A%=A%+(R%=4)-(R%=2):B%=B%+(R%=1
)-(R%=3)
  390 PROCreadch(A%,B%)
  400 VDU19,2,2,0,0,0,17,2,31,A%,B%,2
26
  410 IFS%=8THENVDU31,A%,B%+1,224
  420 SOUND0,-15,20,sound
  430 IFT%=15 rightcrash=TRUE
  440 ENDPROC
  450 REM*************************
  460 DEFFNpaddles(P%,OD%)
  470 LOCALC%
  480 D%=0
  490 ch1%=128-(ADVAL(P%) DIV 256):ch
2%=128-(ADVAL(P%+1) DIV 256):IF ch1%=
0 THEN ch1%=1
  500 IF ch2%=0 THEN ch2%=1
  510 C%=ABS(ch1%/ch2%)
  520 IF ch2%>80 AND C%<1 D%=3
  530 IF ch2%<-80 AND C%<1  D%=1
  540 C%=ABS(ch2%/ch1%):IF ch1%>80 AN
D C%<1 THEN D%=2
  550 IF ch1%<-80 AND C%<1 THEN D%=4
  560 IFD%=0 =OD%
  570 =D%
  580 REM*************************
  590 DEFFNboardR(OD%)
  600 LOCALC%
  610 D%=0
  620 D%=((INKEY(-57))*-1)
  630 IFD%=0 D%=((INKEY(-104))*-2)
  640 IFD%=0 D%=((INKEY(-103))*-4)
  650 IFD%=0 D%=((INKEY(-73))*-3)
  660 IFD%=0 =OD%
  670 =D%
```

Turn to Page 187

COLOURJET

36 COLOUR INK JET PRINTER

Prints all BBC Micro
screen Modes inc.
Mode 7 . . . in full colour

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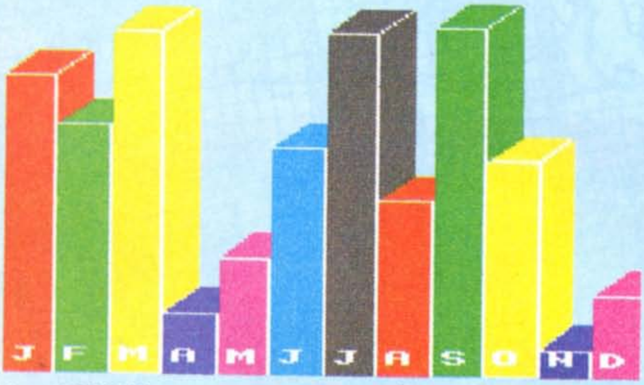

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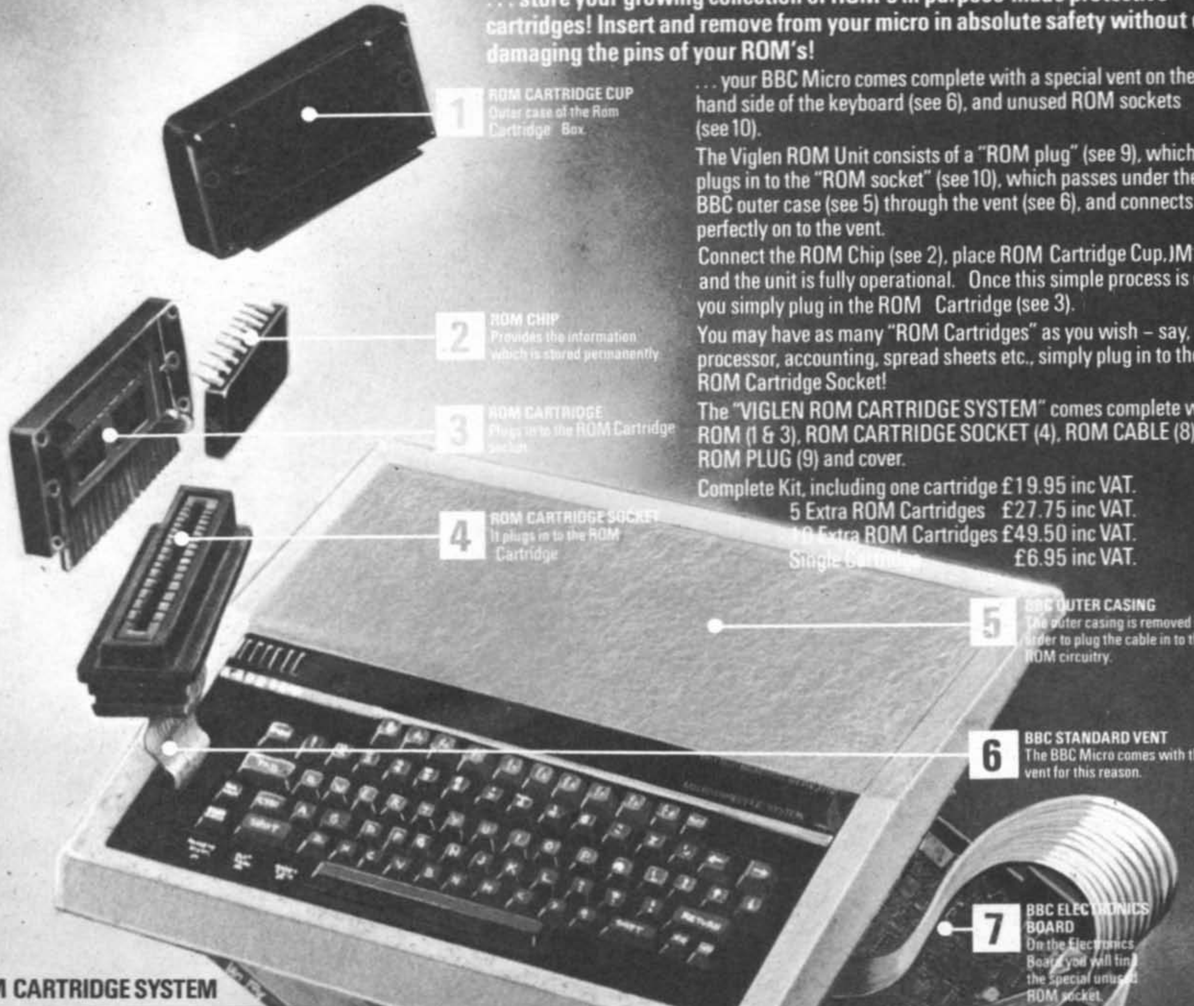
1 ROM CARTRIDGE CUP Outer case of the Rom Cartridge Box.
2 ROM CHIP Provides the information which is stored permanently
3 ROM CARTRIDGE Plugs in to the ROM Cartridge socket
4 ROM CARTRIDGE SOCKET It plugs in to the ROM Cartridge
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MU11/1

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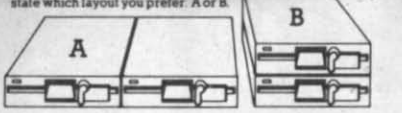

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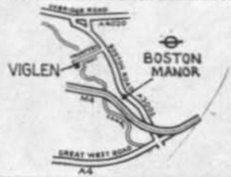

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MU 11/2

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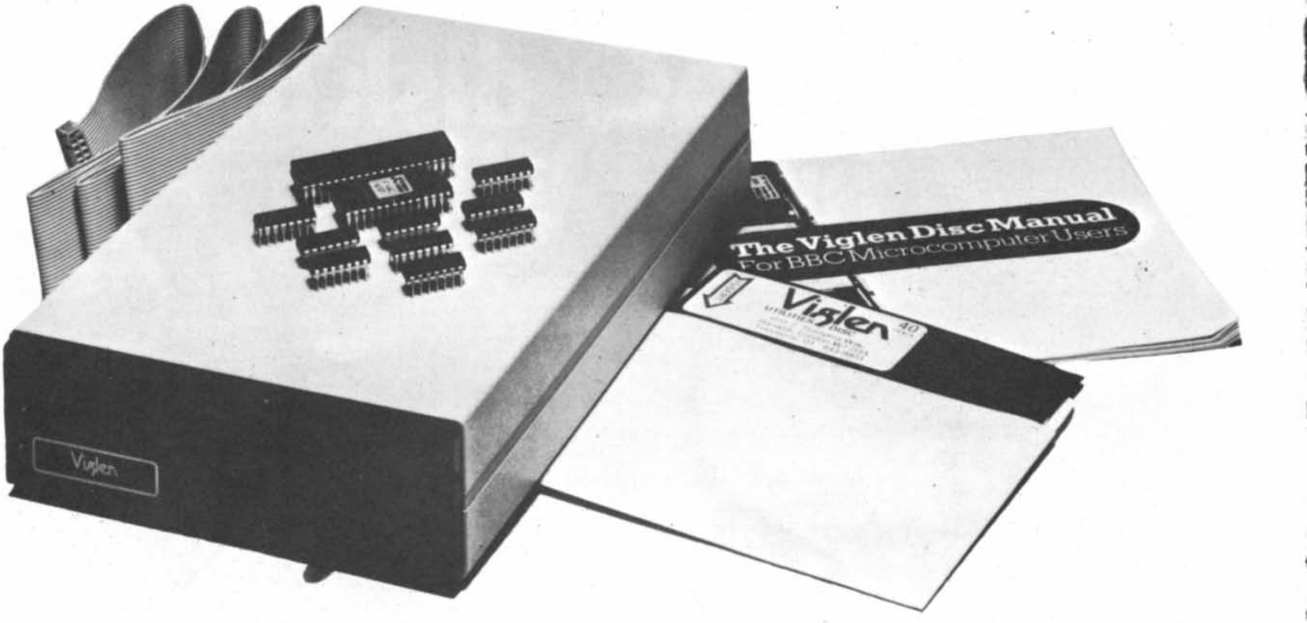

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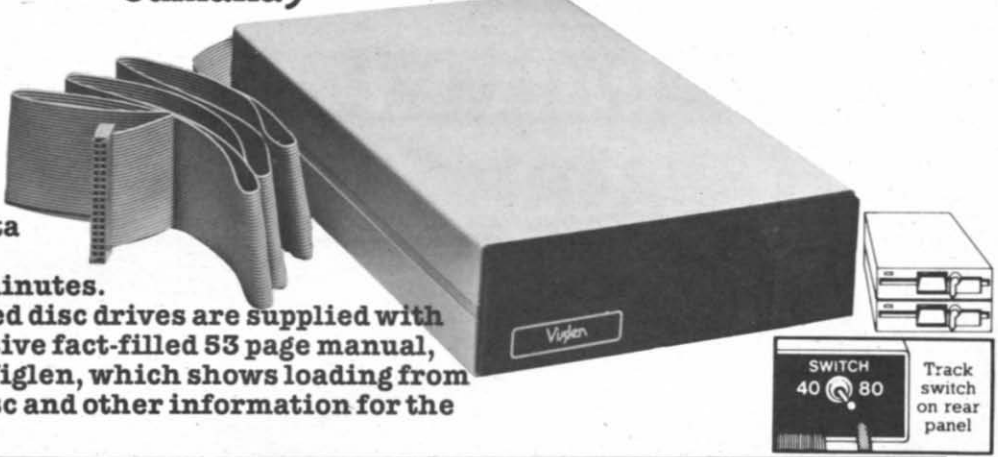

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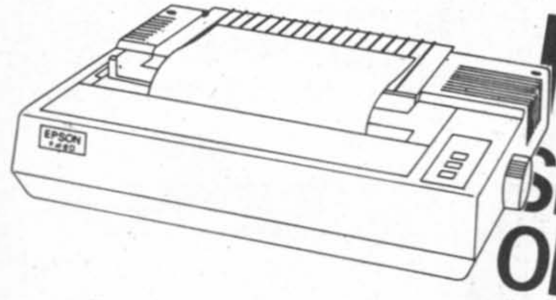

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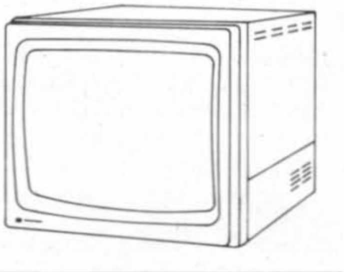

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MU11/5

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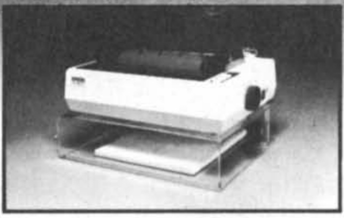

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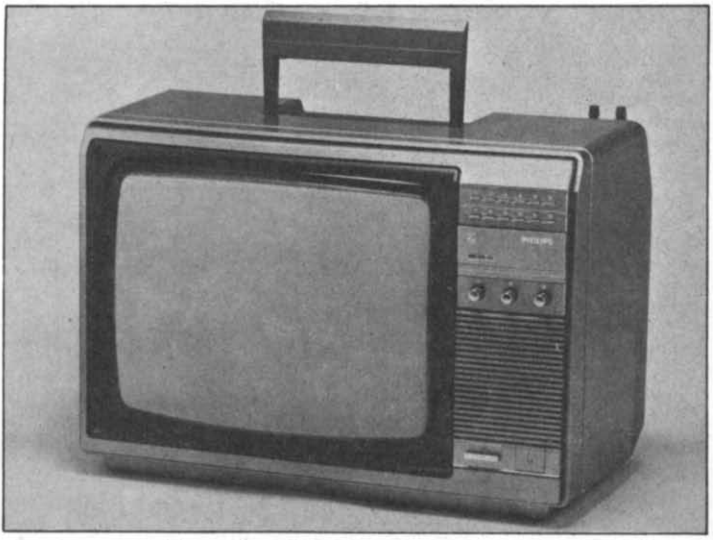

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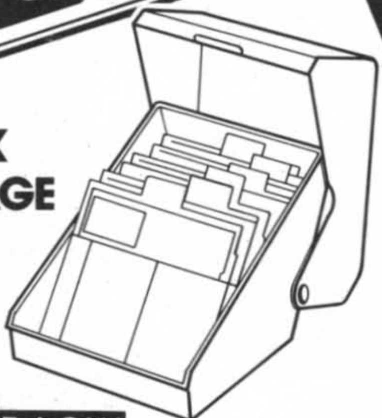

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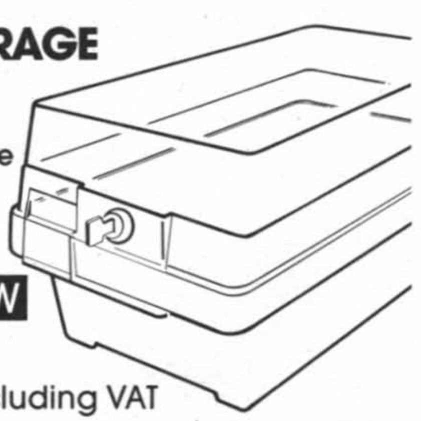

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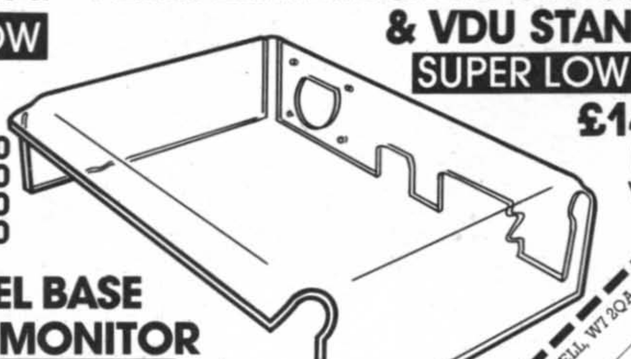

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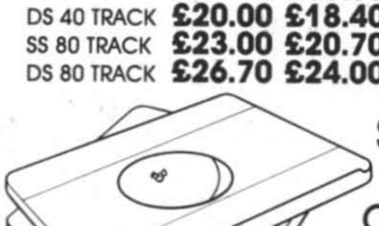

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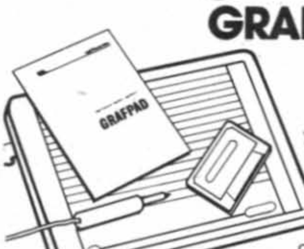

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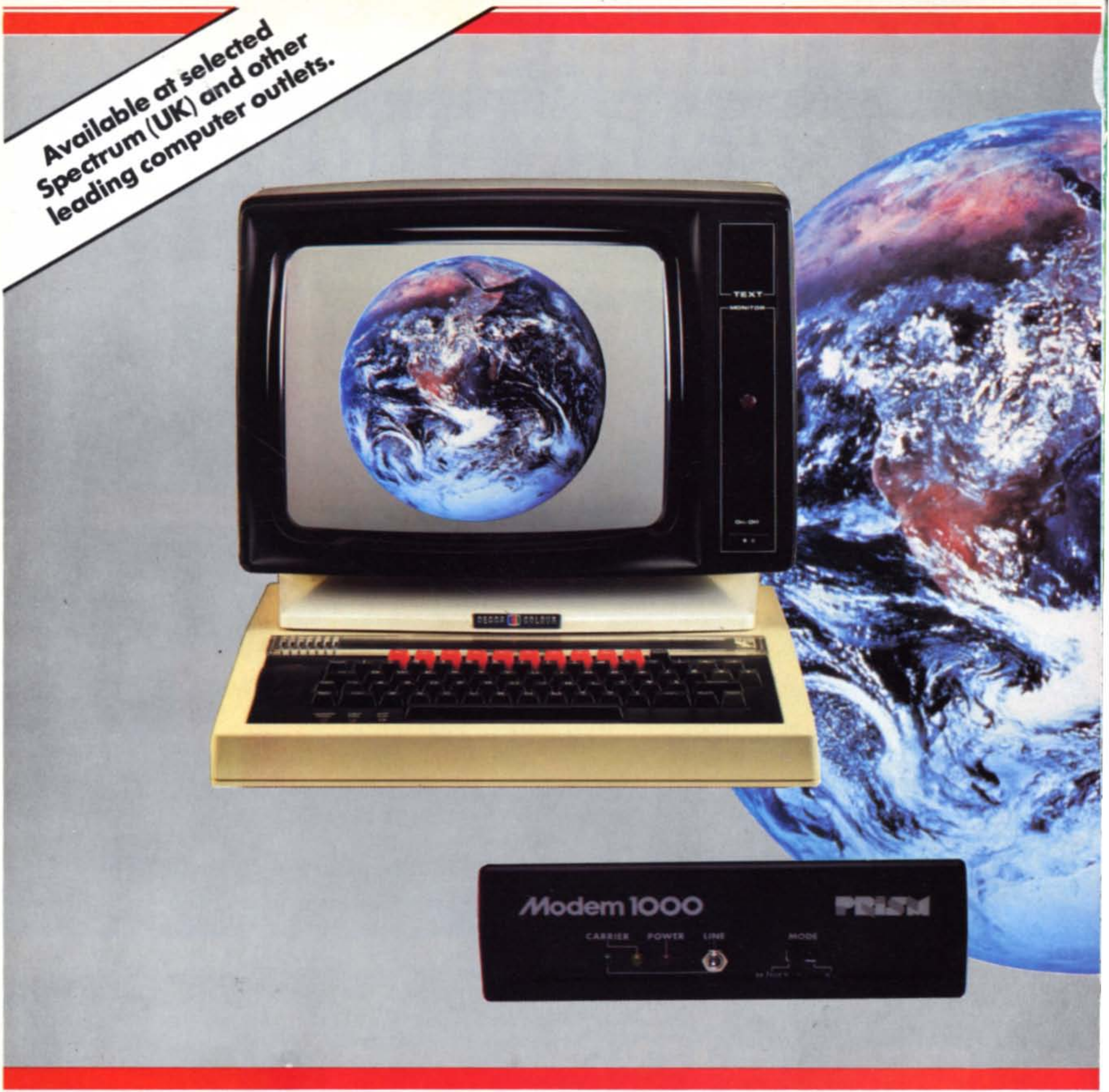
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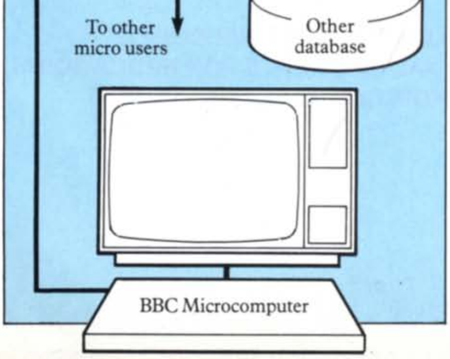

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GRAFPAD

THE FIRST PROGRAMME

displays the co-ordinates of your screen area. The co-ordinates are based on the screen with a grid size of 1023 x 1279 pixel, also in the Grafpad giving you a grid size of 320 x 256 pixels! This is to allow you to write your own graphic programmes.

THE SECOND PROGRAMME

provides you with the utilities for circles, squares, triangles, free-hand, erasing line-drawing etc, and of course, full "Fill-in" facility in 16 different colours by the simple use of the pen!

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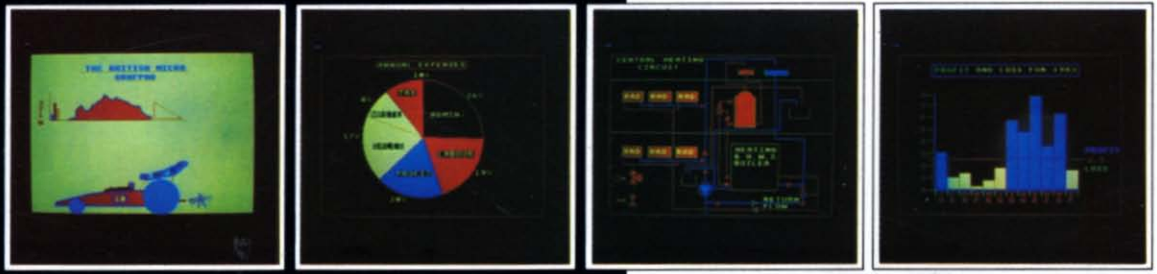

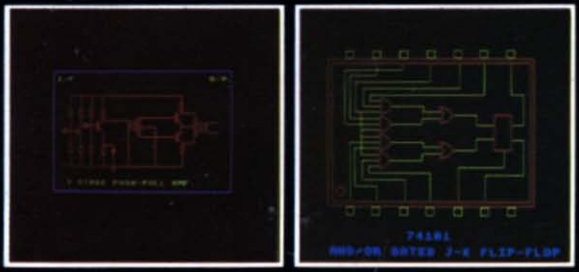

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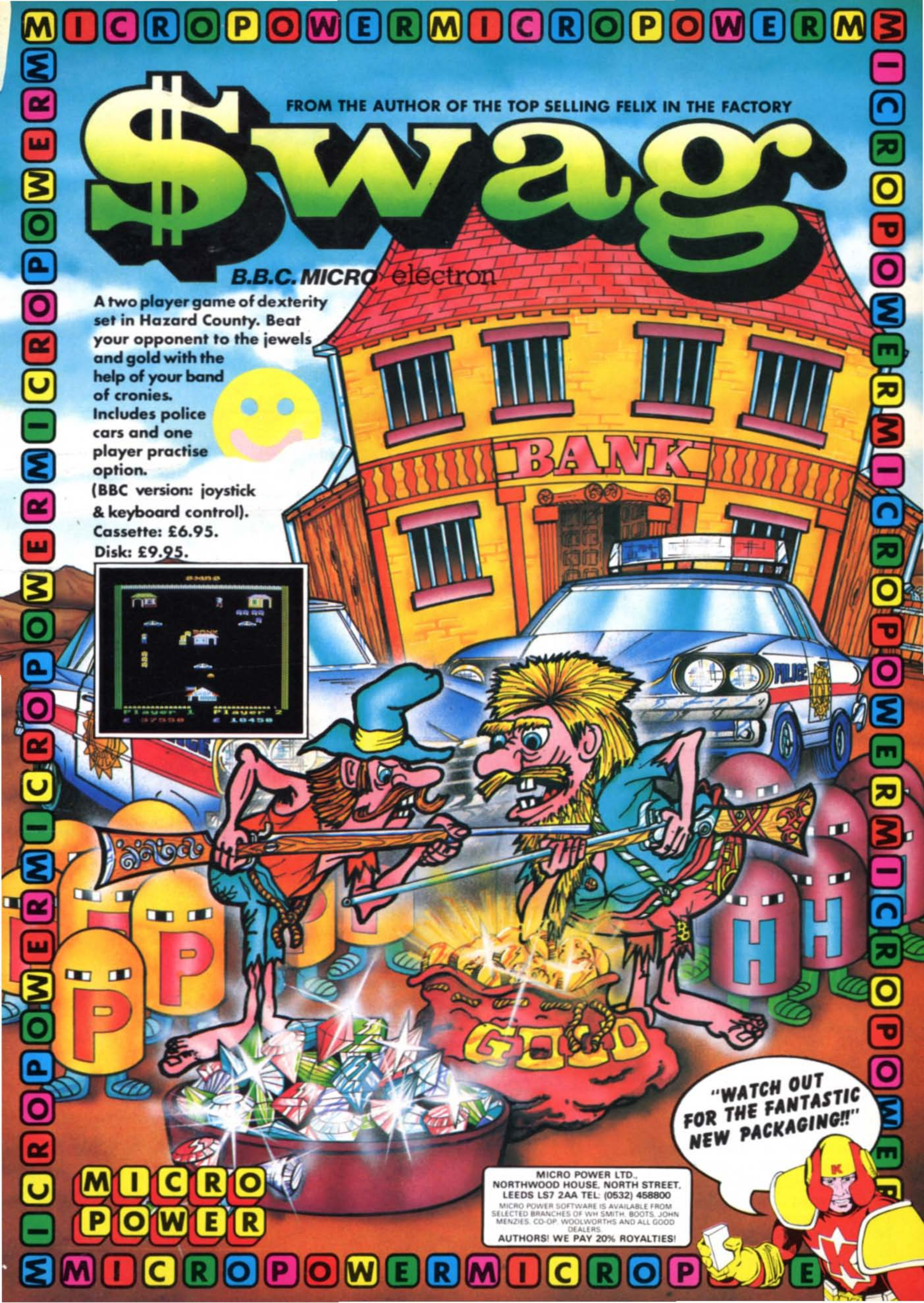
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BLOCKBUSTER

Align the magical diamond blocks or become a victim of spontaneous combustion in this fast maze game by

MARK MELFORD

FOR reasons that are not clear to him, Seamus, the energetic little green man, has been transported into a vast maze with no way out.

His only hope of survival is to align the three magical diamond blocks before time runs out and he becomes victim of the freak phenomenon "spontaneous combustion".

Seamus can push blocks by running into them. This does not sap his energy but renders him immobile until the blocks have stopped moving.

By holding down Return Seamus enters "Blast mode" and can explode any obstructive block he runs into at a cost of 10 units of energy. Diamond blocks are indestructible.

With these powers the task may seem easy. But Seamus is not alone in the maze. Pursuing him relentlessly are the Gremlins. If Seamus meets one, energy plummets as he grapples with the beast.

The persistent Gremlin can be dealt with in two ways. Pushing a block over one will squash him. Tamer species of Gremlin can be lured into corners and trapped.

However if Seamus should align the diamond blocks he is transported to a new, more exhausting maze with a wilder, nimbler species of Gremlin, some of whom can penetrate any wall.

If one of these Gremlins is squashed he soon pops up again elsewhere in the maze.

Points are awarded for:

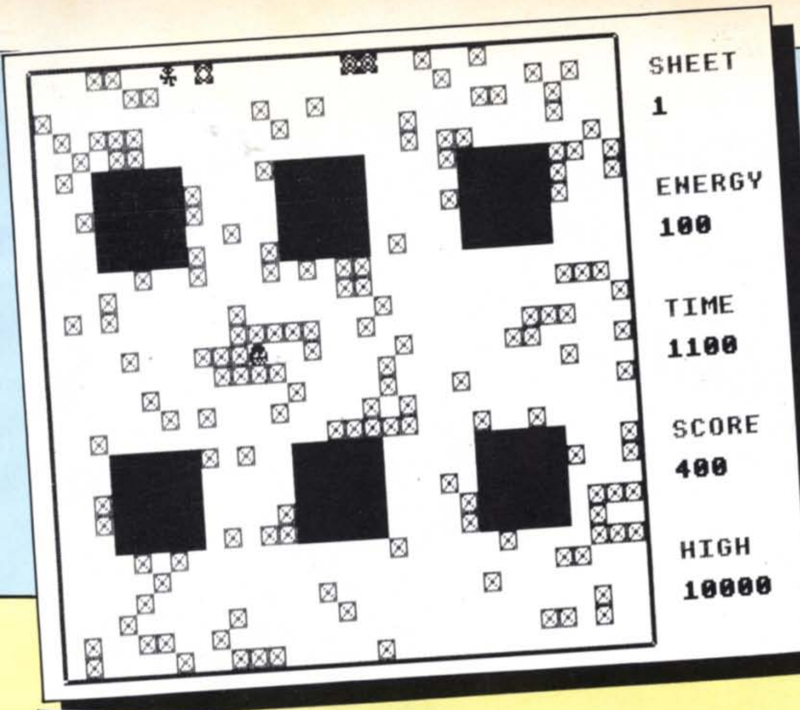
- Time remaining when the diamond blocks are aligned. (They must be pushed into a line. Pushing them into a clump will not do).
- Squashing the Gremlin. Ten energy units are awarded for this.

Quick thinking and a keen sense of engineering are essential in this mind-stretching, action-packed game.

Are you a Blockbuster?

PROGRAM STRUCTURE

Lines 160-200	Main loop.
PROCBLOCKS	Prints ice blocks.
PROCMEGGA	Prints diamond blocks.
PROCBOX	Prints big yellow boxes.
PROCEDGE	Draws screen border.
PROCKEYS	Checks for keyboard entry.
PROCMAN	Prints appropriate pose of Seamus.
PROCGREM	Prints appropriate species of Gremlin.
PROCCHECK	Checks to see whether the Gremlin has collided with anything.
PROCTHINK	Decides on the direction a pushed block will move in.
PROCSHOVE	Moves the pushed block.
PROCMOVE	Calculates Seamus's position each time it is updated.
PROCSCORE	Prints up score, energy and time.
Lines 820-890	Handles end of game and restarting.
PROCCALLS	Calls checking routines for all possible alignments of three diamond blocks.
PROCLINE	Horizontal checking.
PROCLINE B	Vertical checking.
PROCWIN	When screen is successfully completed.
PROCFANFARE	Plays tune at start of each screen.
PROCBANG **PROCSHATTER** **PROCDOT**	Block explosion.
PROCBumped	Action if Gremlin is hit by moving block.
PROCRESTORE	Handles actual death by splattation of Gremlin and resetting of variables thereafter.
PROCSQUASH	Displays the gory detail.
PROCTOUCH **PROCTOUCHED**	Decides whether Gremlin has been hit.
PROCMC	Machine code to speed up the shape plotting slightly.
1760 onwards	Initial fanfare and controls display Sets up VDUs and envelopes. Deleted before game starts.



VARIABLES

X%	Seamus X coordinates on screen.
Y%	Seamus Y coordinates on screen.
M%	Seamus shape (224 or 225) identifies VDU.
A% B%	Gremlin X coordinates on screen. Gremlin Y coordinates on screen.
V% W%	Gremlin X and Y step size if he collides with anything.
C% D%	Direction at block once pushed.
E%	Colour of moving block (diamond or ice).
MV%	1, 2, 3 or 4 depending on direction Seamus is moving.
SC%	Remaining energy.
ET%	Step size at Gremlin.
CV%	1 when tune is playing.
DAT%	Screen number.
SS%	Step size of particles of an exploding block.
PT%	Your score.
LOP%	9 when a screen is completed.
BOP%	Amount of time and energy decrease by each new screen.
&70	Ascii code of Block.
&71	Ascii code of Gremlin.
&72	Ascii code of Seamus.
@%	Gremlin shape (similarly to M%).
TI%	Time.
HIT%	1 if Seamus is in Blast mode.
Q% R%	Added to X%, Y% respectively and used with POINT to find out if Seamus touches a block.
GX% HX% GY% HY%	Used to find out if Gremlin is touching Seamus.
F% G%	Coords of moving block.
JJ%	Number of diamond blocks correctly aligned horizontally. If three then screen completed.
SJ%	Number of diamond blocks correctly aligned vertically.
AF% AG% BF% BG%	Used to find whether a moving block has struck the Gremlin.

```
    5 REM BLOCKBUSTER
    6 REM (c) Micro User
   10 GOTO1760
   20 VDU21
   30 *FX138,0,129
   40 END
   50 VDU6:DIM HI(2):HI(1)=10000:CLS:
PRINT:PRINT"   Press Space or Fire"
   60 IFINKEY(-99)THENGOTO80
   70 GOTO60
   80 MODE1
   90 *FX9,5
  100 *FX10,5
  110 X%=328:Y%=320:M%=224:A%=648:B%=
512:V%=8:W%=8:C%=0:D%=0:E%=0:MV%=1:SC
%=500:ET%=8:CV%=1:DAT%=0:SS%=8:E1%=F%
+16:F1%=Y%-16:E2%=F%+16:E3%=F%+16:F2%
=Y%-16:E4%=F%+16:BV%=0:PT%=100:LOP%=0
:BOP%=0:BAG%=1:?&71=234:?&70=227:?&72
=224:@%=234
  120 VL%=1:JIK%=0:VDU5,19,1,5;0;19,2
,3;0;19,3,2;0;23;8202;0;0;0;:PROCMC
  130 PROCBLOCKS:RESTORE:SC%=500-BOP%
:VDU4:COLOUR1:PRINTTAB(34,2);"SHEET":
PRINTTAB(34,8);"ENERGY":PRINTTAB(34,1
4);"TIME":PRINTTAB(34,20);"SCORE":PRI
NTTAB(34,26);"HIGH":COLOUR3:PRINTTAB(
34,4);BAG%:PRINTTAB(34,28);HI(1):LOP%
=0
  140 PROCSCORE(SC%,34,10):PROCSCORE(
PT%,34,22):GCOL3,3:MOVE328,320:VDU224
:GCOL3,2:MOVE648,512:CALL T:PROCEDGE:
FORLP%=104TO804STEP320:PROCBOX(LP%,67
6):NEXT:FORLP%=104 TO 804STEP320:PROC
BOX(LP%,228):NEXT:PROCMEGGA:CV%=1
  150 TI%=10000-(10*BOP%):PROCSCORE(T
I%,34,16)
  160 PROCKEYS
  170 PROCGREM
  180 IFCV%=1THENPROCFANFARE
  190 IFLOP%=9THENGOTO130
  200 GOTO160
  210 DEFPROCBLOCKS:LOCALX%,Y%:GCOL0,
1:FORLP%=0TO200:X%=RND(992/32):Y%=RND
(960/32):MOVEX%*32+8,Y%*32+32:VDU227:
NEXT:ENDPROC
  220 DEFPROCKEYS:HIT%=0
  230 IFINKEY(-74)THENHIT%=1
  240 IFINKEY(-98)THENMV%=1:Q%=-4:R%=
0:PROCMAN:PROCMOVE(-32;0):M%=M%+1:PRO
CMAN
  250 IFINKEY(-67)THENMV%=2:Q%=32:R%=
0:PROCMAN:PROCMOVE(32,0):M%=M%+1:PROC
MAN
  260 IFINKEY(-73)THENMV%=3:Q%=0:R%=4
:PROCMAN:PROCMOVE(0,32):M%=M%+1:PROCM
AN
  270 IFINKEY(-105)THENMV%=4:Q%=0:R%=
```

Turn to Page 172

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How to blow your own violin...

THE BEEB BODY BUILDING COURSE

Part 20

By MIKE COOK

HAVE you noticed how smug your computer can be? I mean, you type in something like PRINT 2/PI and before you have taken your finger off the Return key the damn thing has printed out the answer and is ready for more.

Well, now we'll show it who is boss, as the computer will have to earn its corn.

We will use last month's D/A converter to enable the computer to recreate the sound of any musical instrument – and even to invent your own.

Last month we saw how we could generate any waveform from the D/A converter. We could specify that waveform as a sum of harmonically related frequencies to produce different sounds, rather like an organ pulling out more stops.

However the range of pitches that could be produced was limited and the notes could not be made to sound like blown or bowed instruments, like a trumpet or violin. Now I know that a blown violin is a very rare sound but it can be made!

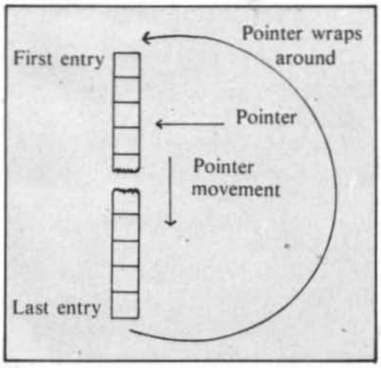

Figure I: Waveform lookup table

Let's see how to overcome those problems with software alone.

To produce a note we need a lookup table in memory containing the amplitude of the waveform at each sample period. This is shown in Figure I.

We move a pointer through the table fetching the contents of each entry and sending them to the D/A converter. When the pointer reaches the end of the table it wraps around or starts again at the beginning.

As the table represents one cycle of a tone, in order to get tones of different pitch we must complete the scan of the table in different times.

We saw last month that this could be done by varying the time between each sample. However this does not provide very fine control, as the computer cannot operate fast enough.

To generate a 1KHz tone with 256 samples we would need to fetch a sample every four microseconds. This is much faster than most computers can cope with.

In addition the time could not be varied finely enough to be able to generate the exact pitch on a musical scale.

Well, if we can't vary the sample time, the solution is not to take every sample in the table. However if we get every other sample we will double the frequency and not be able to get anything in between.

The solution is to step through the table, not in an integer fashion but in a fractional way. At first sight this appears to be impossible as the table entries are at integer positions.

But if we have the pointer as a fixed point decimal number and use only the whole part of the number to access the table, we can then move the pointer a fractional amount and finely control the time it takes to scan through a table.

So we need a pointer and a pointer increment value both stored in two bytes – an integer part and a fractional part.

How can we represent a fraction in a binary fashion?

To represent an integer we assign each binary bit a power of two. To represent a fraction each bit to the right of the decimal point – I should really say binary or bicimal point – represents a negative power of two.

Figure II shows this along with the decimal equivalent of the significance of each bit. You can see that simple decimal values like 0.3 will need a lot of bits to represent them accurately.

In fact some decimal values require

→

2↑-1	2↑-2	2↑-3	2↑-4	2↑-5	2↑-6	2↑-7	2↑-8	Power
0.5	0.25	0.125	0.0625	0.03125	0.015625	0.0078125	0.00390625	Value
7	6	5	4	3	2	1	0	Bit

Figure II: Binary fraction

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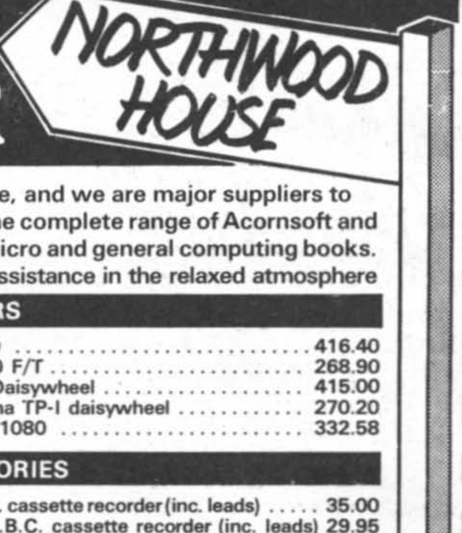

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From Page 105

an infinite number of bits to represent them. Nevertheless we only need one byte for our purposes.

The great advantage of representing a number in this format is that the normal addition operation works just the same as if it were a two byte integer.

Therefore by specifying the correct incremental fraction we can tailor exact frequencies.

Of course the number of samples per waveform is lower than it would normally be, but due to the wrapping round of the pointer each traverse through the table takes a different set of samples from the last.

Overall the ear is fooled and the reduced resolution of sampling is hardly noticed.

The only requirement is that at least two samples must be taken per traverse of the table to prevent aliassing from occurring. This would produce low frequencies which sound discordant.

If the waveform table contains more than one cycle of a waveform at least two samples of each cycle of the waveform must be taken.

Aliassing is a product of sampling a waveform. Supposing you sampled a waveform at exactly the same point each time, the output would appear to be a steady DC level.

Now suppose that you sampled the waveform at just longer than its period, then you would sample it at a progressively later point in each cycle, resulting in a frequency related not to the original table but to the sampling rate.

I am sure you have all seen examples of this, such as in old cowboy films where the wheels of the speeding stagecoach appear to be moving slowly backwards.

The picture is being sampled by the film camera, but the spokes of the wheels are moving more than one segment of the wheel per sample. This is a case of visual aliassing.

So now we know how to get precise tones out of a waveform table we can concentrate on the tables themselves.

We saw last month that we could put any sequence of bytes in the table and represent various harmonics. However what characterises the sound of a real instrument is the changing harmonic content of the note over time.

If you have experimented with the Envelope command on the computer's built-in synthesiser you will know the tremendous difference this makes to the sound.

However the Envelope command only varies the amplitude of the note produced by the computer. What we need is to vary both the amplitude and harmonic mix.

Well, it is not on to change the values in the waveform table when it is being read. But what can be done is to switch the waveform table the pointer is accessing. If this changing is done at regular intervals you can have the waveform changing as the note progresses.

Of course these tables have to be precalculated, but after all you do have a computer to do this. Therefore we need a way of specifying the envelope shape of each harmonic, and that is what this month's software offering allows you to do.

The program is shown in Listing I. It allows you to define 32 waveform tables with up to eight harmonics in each. Then you can hear the results of your creation by pressing the keys on the keyboard.

The program is simplicity itself to operate. It uses nearly all the available memory on a disc machine and so, if you have more memory-grabbing sideways ROMs installed, you should set PAGE to &1900 before loading the program.

Alternatively you could apply memory-saving techniques such as removing the spaces and making multi-statement lines.

The only action I had to take was to remove the remarks from the machine code section, but as this is identical to that in Listing II you can follow what is happening.

When it is run the menu will appear after a short initialisation time. The first thing to do is select how many harmonics you want to use – two will be fine to start with.

Then you can select the "draw" option. You will be asked which harmonic you want to view, so type the appropriate number.

You will then get a display of the envelope of the harmonic. The first time around this may be anything, as the description is stored in memory and not initialised each time the program is run. This allows you to debug or make modifications to the program without destroying your work.

The envelope can be defined by use of the cursor keys. You will see at the bottom of the graph two pointers, one of them underlined. This is the active pointer and may be moved to the left and right with the cursor keys.

By using the up and down cursor keys the harmonic value at that point may be altered. The envelope is drawn as a straight line between the two pointers and as the active pointer value is moved so the envelope rubber bands.

The other pointer may be made the active one by pressing the space bar.

I find the easiest technique is to draw the envelope in small sections, swapping the active pointer and leap-frogging over other pointers. In this way curves can be simply constructed.

An easy way of clearing an envelope is to position the pointers at both ends and press the down cursor key.

The control on the amplitude at each point moves very slowly with the cursor keys. So to get it into roughly the correct position you can hold the shift key at the same time.

All movement is fully protected and it is impossible to exceed the limits on the graph.

When you have finished defining the harmonic envelope you press Return and select the next one. You do have the option of seeing all the harmonics plotted on the same graph. This is useful for a final check.

When you have finished return to the menu. Now select the Calculate option, and the waveform you have just defined is calculated.

First the scaling factors are calculated and then the tables themselves. These are placed directly into memory again so they will not be lost if you re-run the program.

This is where we really make our friendly computer earn its corn. There are 32 tables, each one containing 256 points. Each point needs one SIN calculation and multiplication per harmonic and, as there can be up to eight of these, this works out at over 65,000 SIN calculations.

This understandably takes some time. For a full eight harmonic waveform it will take just over half an hour. Anyway the computer will give you a very approximate estimation of how long it is going to take.

It is probably prudent not to hold

→

From Page 107

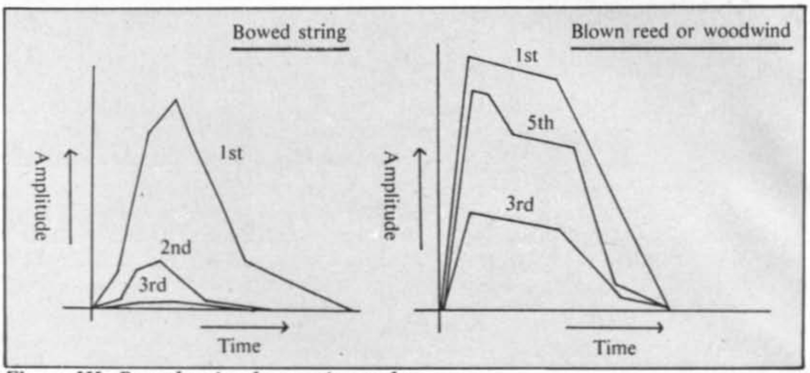

Figure III: Bowed string harmonic envelopes

your breath and wait but to go and read the rest of *The Micro User*.

When the computer has finished chugging it will bleep and tell you. At this point you can save the tables on a disc or tape file so that it can be loaded again quickly. Even using tape files it is many times faster than re-calculating it.

The file name you specify is automatically placed in the directory "T", which stands for table, and will help prevent you mixing it up with any programs.

Having safely tucked away the fruits of your labour you can now look at a plot of the waveform tables by selecting the View option. Each waveform is plotted in turn when you press the space bar. Note that if you hold down the space bar the auto repeat function will fill up the buffer and the waveform will be plotted at full speed. Pressing Return will put you back to the menu.

Finally the sound may be heard by choosing the Play option. Each key produces a different note over four octaves. The notes are all in the key of C and are in alphabetic order. Not the easiest way to play a tune – but more of that later.

So you can create a sound and hear the results. I would have liked to include a few more options, but the dreaded "No room" message intervened.

So I wrote a second program (Listing II) which will give a demonstration tune and configure the keyboard in an approximation of a piano keyboard. The row starting with the A key represents the white notes and the keys above it the black ones. Any other key will not produce a note.

As the program can generate notes over four octaves the octave of the keyboard can be shifted by using the space bar. This moves the notes produced by each key up an octave and the octave number is displayed on the screen.

The tables generated by the first program can be loaded by this one. As the section of memory stored on the files includes the machine code to produce the note, lines 260 to 820 do not strictly need to be typed.

They are included to prevent the program hanging up if you have not loaded in any tables, and also to let you look at the comments which were removed to make the previous program run in the available space.

Finally the Tune option plays a little jingle. The data included was chosen for its maddening ability to drive you round the bend. The convention used to encode the tune is the same as that used in the musical Christmas card published in the 1983 issue of *The Micro User*, so you can have some Christmas carols if you copy over the data statements.

This program also includes a procedure PROC_SOUND that will accept the same numbers as the computer's sound command, therefore making other single voice tune-playing programs easily adaptable.

The data is plotted out as the tune is playing. This is done to give you something to look at and also allow you to debug the data when creating your own tunes.

You can stop the program at this point by holding down the control and shift keys simultaneously. By rapidly releasing and pressing one of these keys you can get it to play one note at a time.

Note that as the waveform tables are stored in memory you can break and alter this program without having to reload the tables each time you re-run it.

Finally an explanation of what is happening in the machine code section.

Table I gives a list of the various page zero locations and what they are used for. The two timers in the VIA are used, timer 1 to control the time between samples and timer 2 to determine the time spent on each waveform table.

As there are 32 tables to get through this timer controls the length of the note.

The most significant byte of this time is stored in memory location &76 and so the length of the note produced can be varied by setting up this memory location before the machine code is called.

When the program is called it first sets up the variables it is going to change through the program. Then the interrupts are disabled, as the processor is going to need all its time keeping up with the program.

The two timers are then initialised and started. Timer 1 is in the continuous mode, whereas timer 2 operates in a one shot mode. The program then goes into a holding loop until timer 1 times out.

Then the pointer is incremented and is used to index the waveform table pointer in locations &72, &73. This uses indirect addressing where the memory location contains not the number but its address. This fetches the next table entry into the accumulator. It is then outputted to the D/A converter.

The program then sees if timer 2 has timed out, and if it has the waveform table to access is changed by simply incrementing the most significant bit of the waveform pointer.

After the waveform table pointer has been changed the required number of times the timers are disabled and the system interrupts enabled and the program returns.

The results can be quite good. On one occasion I even fooled my long suffering wife into thinking someone was playing on our piano.

There is a slight noise caused by the fact that we are only using eight bits and

&70	Fractional part of sample pointer.
&71	Integer part of sample pointer.
&72	LSB of the first byte of the current waveform table.
&73	MSB of the first byte of the current waveform table.
&74	Fractional part of the sample pointer incremental value.
&75	Integer part of the sample pointer increment value.
&76	MSB of timer 2, controls the length of the note.
&78	Number of waveform tables to use.
&79	LSB of the first byte of the first waveform table.
&7A	MSB of the first byte of the first waveform table.

Table I: Page zero memory locations

that we are only taking the integer part of our sample pointer to access our sample.

Also the changing of waveform tables produces a slight audible noise due to the inevitable phase jump which occurs between one waveform and the next.

Figures III and IV shows some types of harmonic envelopes you may wish to try. These will give you a point to start at. See if you can predict the type of sound you are going to get.

However it is more fun to try to make up your own instruments and then put a name to them. Two such are shown in Figure V and were named by Hal Chamberlin in the April 1980 issue of Byte. Let's see what you can come up with.

Unfortunately real instruments still have two tricks to play on us before we can get an absolute mimic of their sound quality.

The first is that some instruments, like the piano, change the harmonic mix with different pitched notes. So you could get a sound like a piano but only over a small range of notes such as an octave.

The second is that certain blown instruments like the flute also have a "breathy" sound mixed in them. This is white noise caused by the act of blowing.

This can be added to the waveforms by adding a small random number to each sample, but I have not got round to trying that yet.

Anyway have fun with creating your own instruments – and get your soldering irons warm for next month's project.

Full listing starts on Page 179

A few hints on typing listings

THE first of the two programs that follow takes a long time to run when calculating the waveforms and it is infuriating to wait over half an hour only to be greeted by an error message.

So to cut down on the running time you can reduce the number of waveform tables you calculate by altering the variable N% in line 50. Remember however that any tables saved to disc can only be read by a program with the same number in N%.

Use the auto numbering command to avoid putting extra spaces at the front of a line, and you would do well to program a function key to re-enable the editing keys, separate text and graphics cursors and clear the screen.

Keep the computer in Mode 4 or above so as to preserve any waveform tables or harmonic envelope descriptions you have calculated.

Change line 260 from "2 STEP 2" to read "3 STEP 3" in order to get a listing on assembly of the machine code. Remember this can be changed back when you have that section working.

Finally, if you do not feel up to it, remember that both programs are available on tape and disc along with the D/A converter offered last week. The order form is on Page 213.

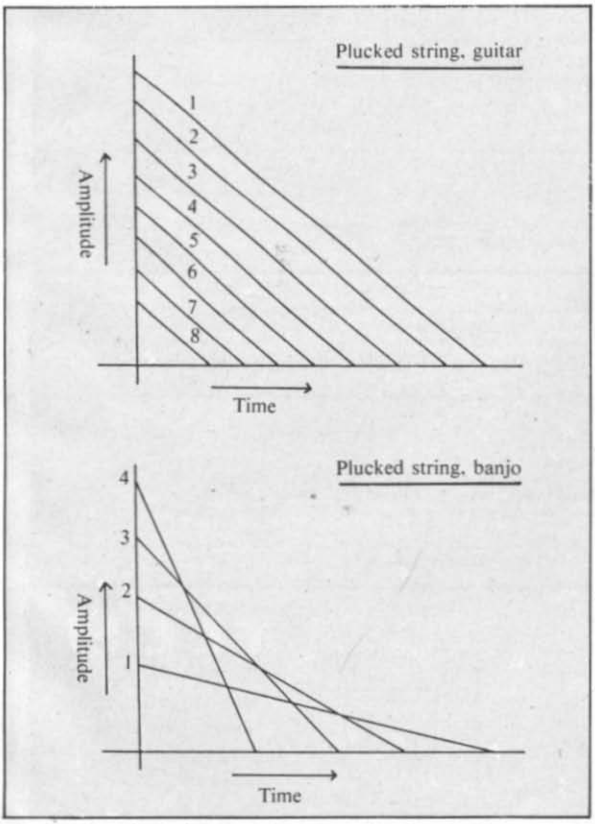

Figure IV: Plucked string, guitar and banjo envelopes

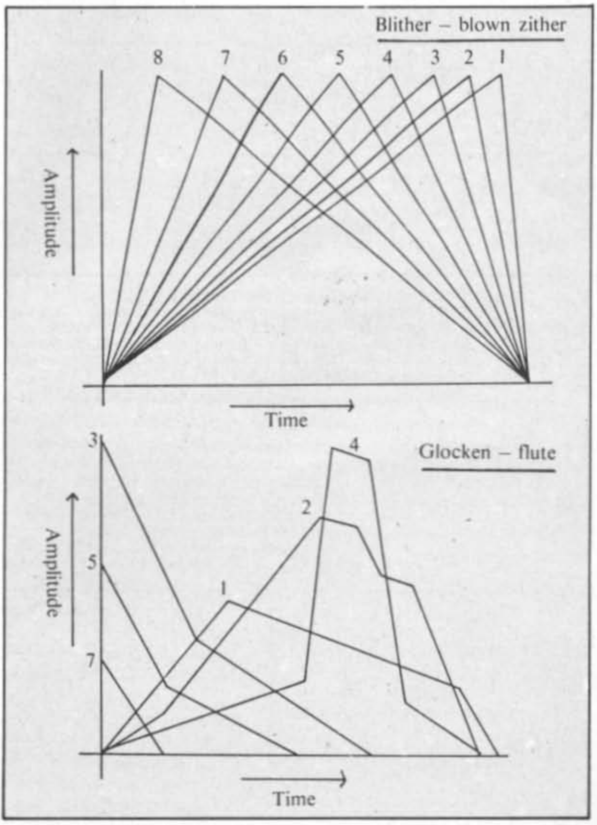

Figure V: Hypothetical instruments' envelopes

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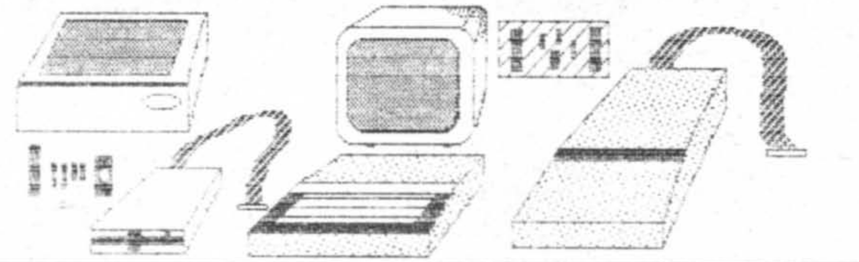

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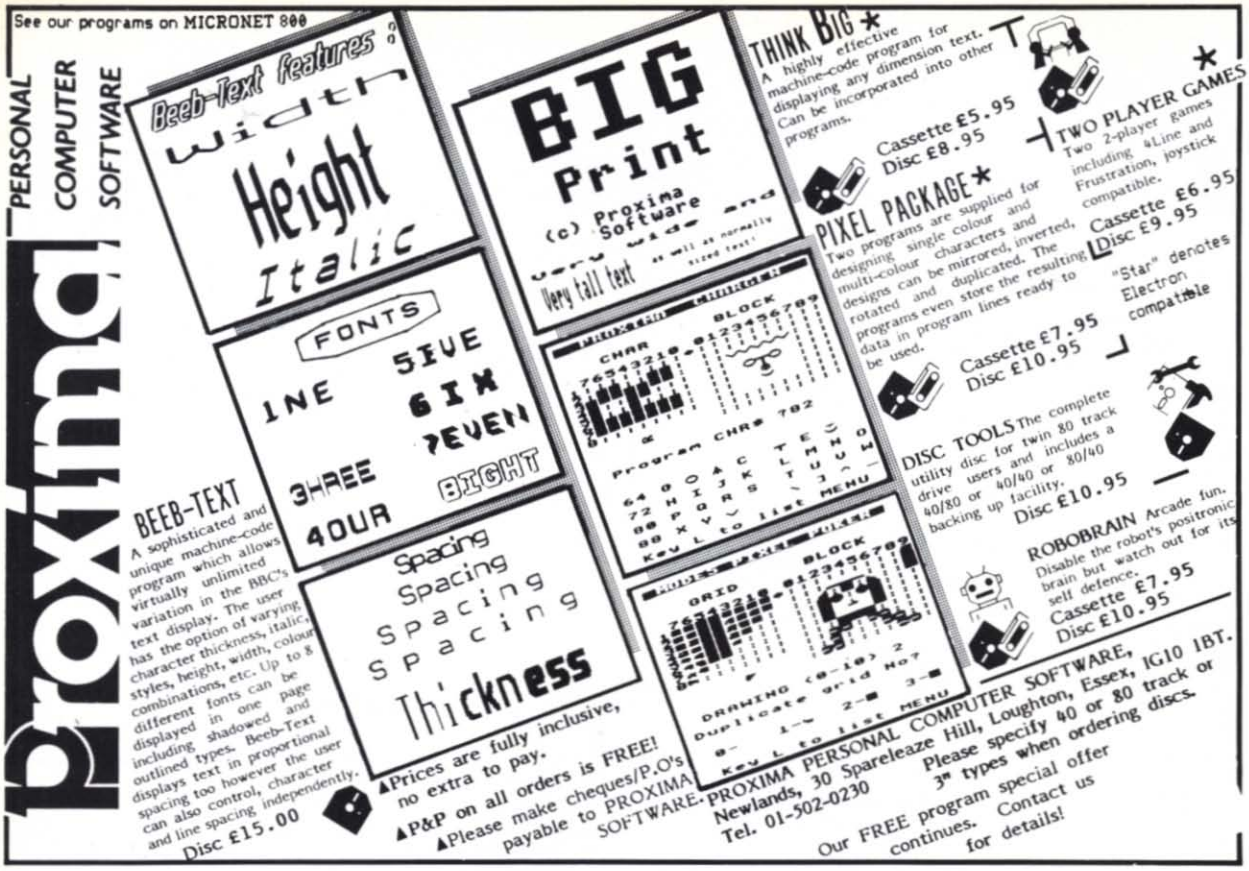
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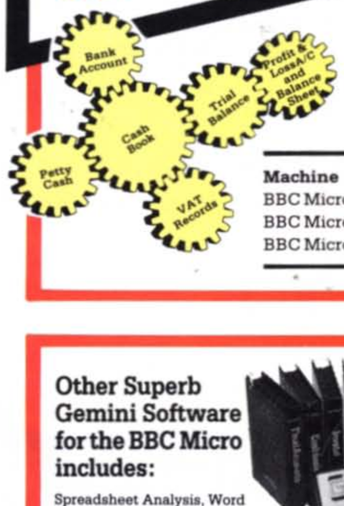

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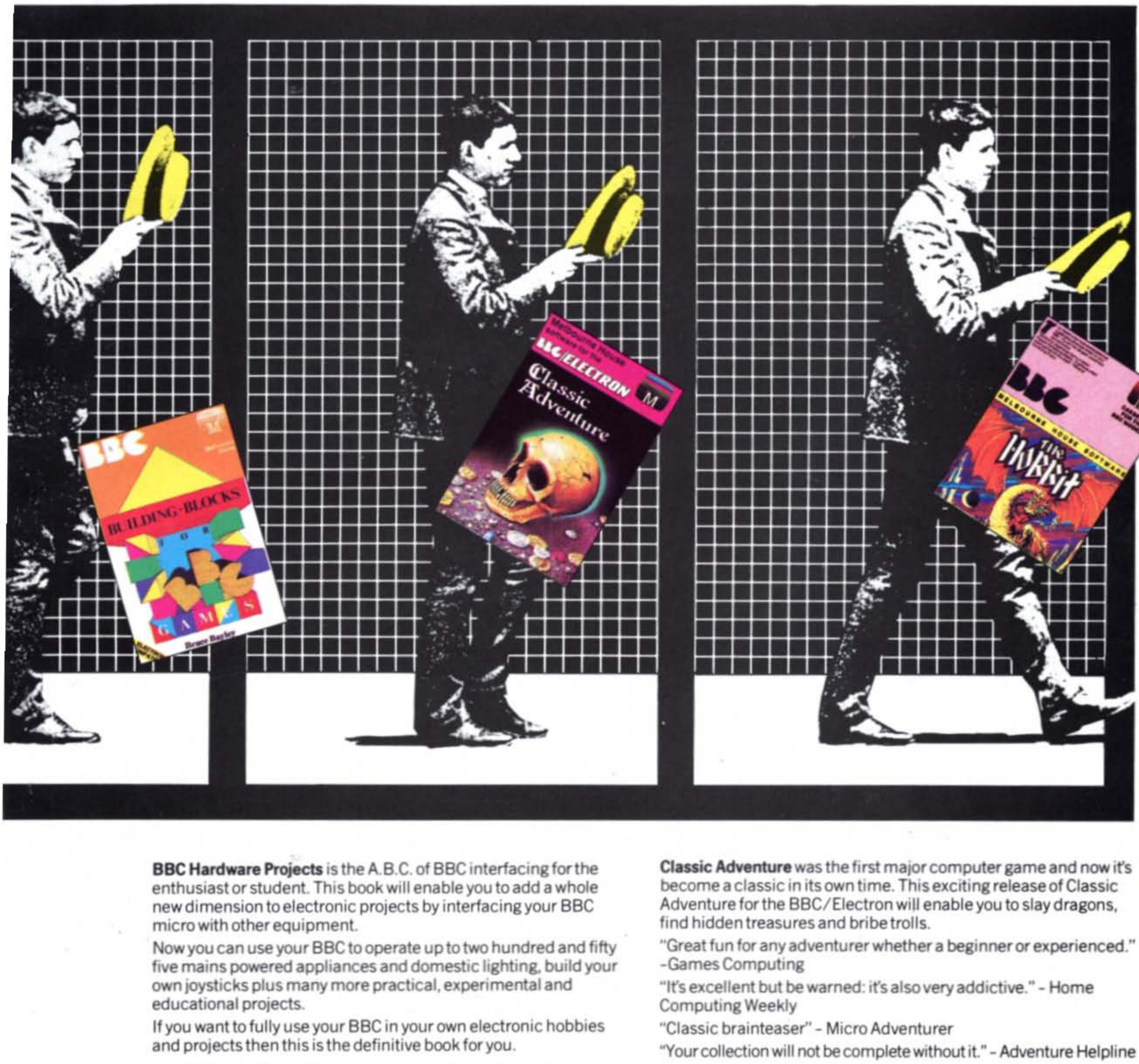

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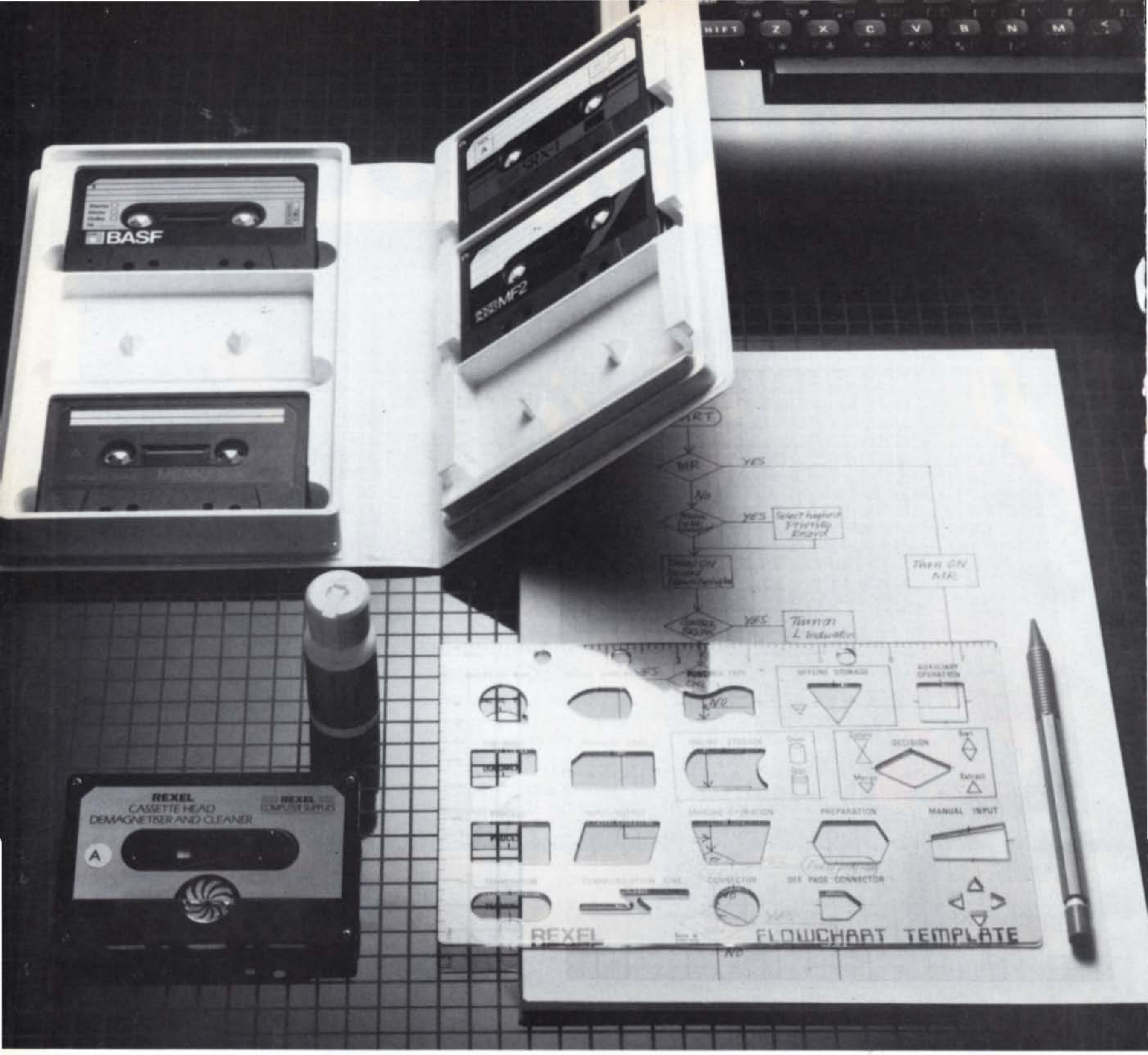
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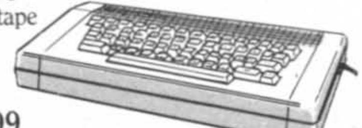

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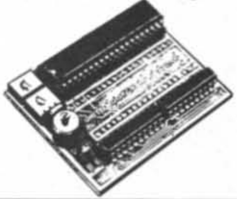

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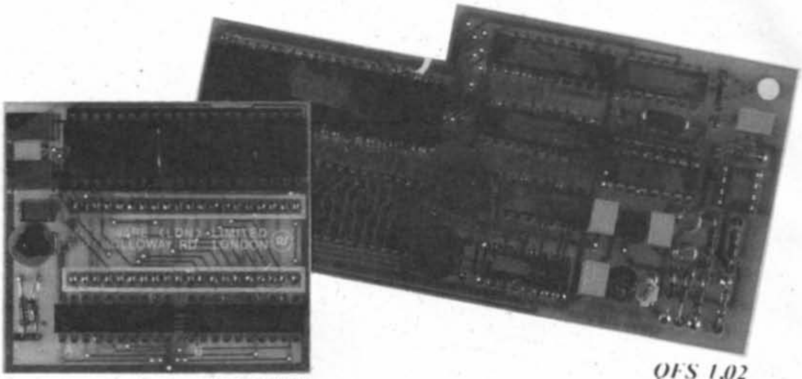


DDFS 0.98

QFS 1.02

FASTCATS!

JIM NOTMAN reviews two faster-than-Acorn double density DFS chips

QFS 1.02 Gnomic
DDFS 0.98 Microware

ONE of the deficiencies of the standard Acorn DFS is that it is based on the 8271 floppy disc controller chip. This is not only expensive and often in short supply but is also only a single density chip.

Information is written onto floppy discs in concentric tracks. Each track is divided into a number of sectors or blocks, each holding 256 bytes.

With the Acorn DFS 10 sectors are written to each track, so that with a 40 track system 100k of data can be put on one side of a disc. With 80 tracks 200k can be put in the same space.

Now density as far as floppy disc controllers are concerned refers to how closely information can be put onto each track.

Double density doesn't necessarily mean that twice the number of sectors can be placed on each track.

Microware says that its DDFS has 16 sectors on a track while Gnomic says the QFS has 18 sectors to the track. Both give a considerable improvement in storage capacity on a disc.

The BBC Micro was not designed for use with double density controller chips and these are not pin compatible with the standard 8251.

Because of this both companies have mounted their chips – along with some other components – on a printed circuit board that is plugged into the socket that the 8271 normally occupies.

The Microware board is small, about 2½in by 2¾in. Fitting is easy – simply plug in the circuit board, interface chips and the DDFS. However, if you have an issue 3 or earlier board other changes will have to be made, no matter which DFS is to be fitted.

The Gnomic board is larger, about 5in by 2½in and has a higher component count. It plugs into the 8721 socket and the socket of IC87.

If there's a wire bridging link at S19 it will need to be cut, so that the wire connected to the central pad can be bent upright and a lead from the extra circuit board connected to it.

Although larger than the Microware board it is set more to the left, so that it is less likely to interfere with any other boards that may be added to the BBC Micro.

With both of them, if you want to use 80 track disc units or need to alter the default speed response of the drives a set of keyboard link switches will need to be fitted. You'll then be able to experiment with the BBC starting up in different screen modes.

Both systems have tried to appear to the user to be much like the Acorn DFS as possible, with similar commands and syntax, and giving all the facilities you would expect.

There is no problem if you get your single and double density discs mixed up. The *CAT heading information is increased to say whether they are single or double density. Both systems are able to sense in which density mode the disc is without help from the user.

This is especially important in being able to transfer programs and data between single and double density modes.

Here the *COPY command must be used rather than *BACKUP, as the

	QFS 1.02		DDFS 0.98		Acorn
	Single density	Double density	Single density	Double density	0.90
1 Open and close file *1000	4.2	4.2	4.1	4.2	4.2
2a Print 1000 numbers	6.6	6.2	6.5	6.2	15.1
2b Print 100 strings	26.7	24.4	26.7	24.8	59.6
3a Input 1000 numbers	5.5	5.5	5.5	5.5	13.0
3b Input 100 strings	25.2	23.4	25.6	23.8	55.2
4 BPUT 1000 bytes	3.4	3.3	3.5	3.3	4.9
5 BGET 1000 bytes	2.4	2.7	2.3	2.5	4.6
6 Move PTR 1000 times	2.2	2.2	2.2	2.2	2.3
7a Write test relative file	27.7	25.6	27.7	25.7	60.9
7b Read test relative file	26.0	24.0	26.0	24.4	56.8
8a Write relative file backwards	81.9	96.0	81.8	96.4	234.6
8a Read relative file backwards	47.4	39.1	47.2	40.3	97.5

Micro User benchmarks: how the three DFSs compare

latter produces a sector-for-sector copy, not possible with the different number of sectors in a track between single and double density.

Each of the double density systems is different, so if discs are written in double density mode they cannot be used in the other system.

The extra command common to both is *FORMAT. DDFS presents a page in Mode 7 with the various options possible. I found the display irritating after a while, mainly due to the large "active box" flashing all the time.

The QFS goes through a list of options one by one. A nice feature here was that there was an option to format both sides of the disc.

As you can see from the benchmarks, there is nothing to choose between the pair in terms of speed. They are both very much faster than Acorn DFS 0.90.

Here I must dispute one of the claims made on the packaging of the Microware system. It says that it is 30 per cent faster than Acorn's on file access. As the benchmarks show, this is often much better than 50 per cent faster.

Documentation is supplied with both systems. The Gnomic 72 page manual supplied was a copy of the BBC disc system User Guide with minor changes concerning the QFS. Fitting instructions and details of the format utility were on an eight page insert.

Microware's manual is also 72 pages long. It is a bit basic, containing details of all the commands in a similar style to the BBC guide but lacking information on file handling.

Although I've been looking at the 0.98 version of the DDFS, other versions are promised by Microware – in particular one which greatly increases the number of files from the 31 that the Acorn DFS allows. I look forward to seeing it.

As the information is stored in a different way in the double density mode it would have been nice if extra utilities had been supplied either on disc or preferably in the DFS eprom, including VERIFY and a sector editor.

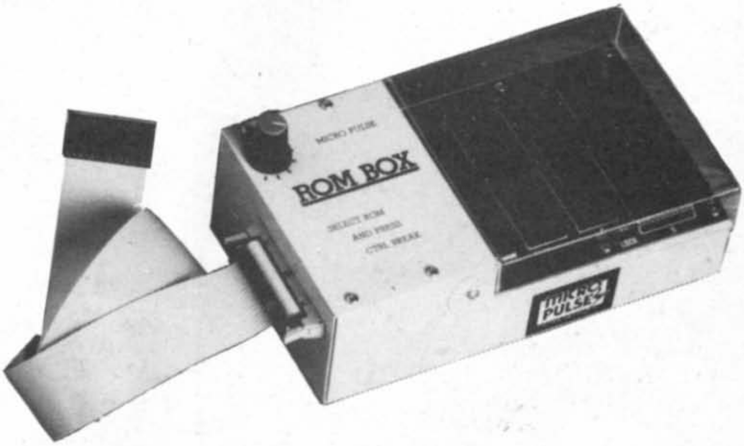
You can see that both of these systems look very attractive, being much faster and allowing discs to hold a lot more information. In most ways they are compatible with the Acorn system.

There is one major disadvantage. Software writers are becoming more and more devious with software protection.

Most use direct programming of the 8271 to accomplish this, so that unless all the 8271 commands can be fully implemented I'm afraid that it will also defeat a double density controller.

So if you have to rely on buying software which is protected, you'll have problems unless either the 8271 commands can be fully emulated or dealers are prepared to supply the software on double density discs for each of these systems.

MIKE MAHON takes a critical look at a handy sideways ROM attachment



***Rom Box** Micro Pulse*

IS this the sideways ROM attachment we've all been waiting for? I'm afraid the answer is – not quite. But certainly it is a good try, and maybe the one which will suit a lot of BBC Micro users.

The trouble with the BBC Micro is that Acorn, having tempted us with the delight of an expandable machine with the possibility of adding up to 16 16k chips of extra software on-line, only provide four ROM sockets.

Furthermore, access to them requires the lid and keyboard to be removed – and a little bravery from the uninitiated – before chips can be replaced or removed.

I'm sure there are very good reasons for this "oversight", such as drain on power supply, security, safety and so on, but now with numerous sideways ROMs on the market only four slots and inaccessibility becomes a problem.

A number of sideways ROM expansion boards are already available, but most have to be fitted, with varying levels of difficulty, inside the micro and therefore remain relatively inaccessible.

The Micro Pulse device is an external box which connects to the BBC Micro by a 28 way ribbon cable and easily detachable edge connector.

The 28 pin dil header to the cable simply plugs into one of the empty sideways ROM sockets in the micro between the operating system and Basic. The short (25cm) cable is then clamped when the computer's lid is screwed back on.

The ROM box itself measures approximately 20 × 11 × 6cm and is one of the best constructed BBC peripherals I have seen.

It is made of metal – painted BBC cream of course – and the eight ROM IC sockets are covered by a hinged clear lid. Seven of the sockets are standard dil type. They are similiar to those on many other boards in being a bit stiff when trying to remove chips (usual advice – watch your legs!).

The remaining socket – numbered 5 – is an easy to use zero insertion force (ZIF) socket providing free and easy insertion and removal of ROMs.

A dial on top of the box allows the user to select the required ROM, which is then indicated by a red light. A two sided A4 instruction sheet provides

⟶

From Page 121

adequate fitting and user information.

The device worked well and caused no problems in use. It also performed correctly when attached to my internal ROM expansion board, and I was tempted to plug in all my 20 sideways ROMs at once. At last I could use my micro with the lid on once again.

There are, however, both advantages and disadvantages to the way the box works. It was useful to have only one (known) sideways ROM in operation at any one time, thus eliminating unwanted software interactions between chips, such as when two chips are using the same * command.

In practice I found myself using the single ZIF socket for this operation most of the time, replacing the desired chip when required without any danger to its legs.

The obvious disadvantage of the box is that, in addition to the three spare sockets on the micro, only one of the possible eight sideways ROMs may be in operation at a given time.

On turning the dial to select an alternative ROM a BREAK is often required to boot the new chip and thus previous information is lost.

This is especially troublesome if the new chip alters PAGE boundaries.

It is advised that Basic and filing system chips remain on board the computer. These may be major problems to program developers who wish to "attack" some software with a number of utility chips almost simultaneously. But for many users who simply want to select a word processor, database or spreadsheet the system is perfectly adequate.

Finally, there does not seem to be any facility to use sideways RAM on this box. Could this be a later addition?

In conclusion therefore, a well built easily accessible external ROM Box for users who wish to select one ROM out of eight at a time.

It's transportability and sturdiness also make it an ideal device for teaching and demonstrating purposes and it will be a pity to lose this when the editor asks for it back.

Like all other ROM expansion boards it does fall short of my ideal, which would be for an external box carrying 16 independently switchable and co-existent ZIF sockets.

All sockets would be numbered and have indicator lights and could take ROM or RAM.

The system would also be lockable and have an inbuilt alarm set off by detachment or attempted software rip-off. Very useful at shows!

Is this just a dream, or can it be made at a reasonable price?

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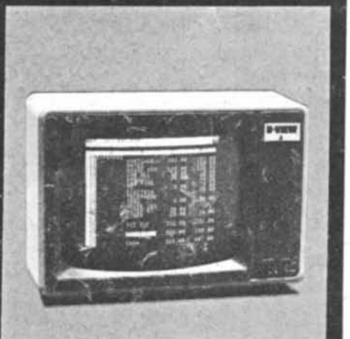

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WHAT THE PRESS SAID

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- A & B Computing, March/April 1984

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- The Micro User, June 1984

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(Machine requirements: Model 'B', MOS 1.2. Hardware plugs into CPU socket, software uses one sideways ROM socket

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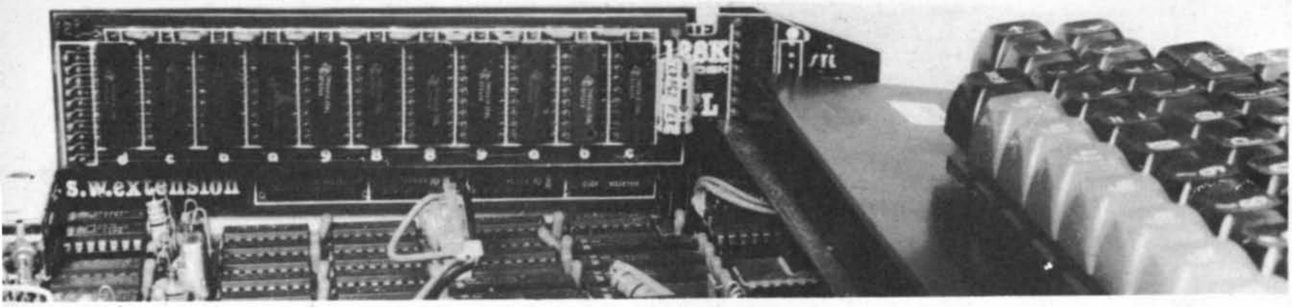

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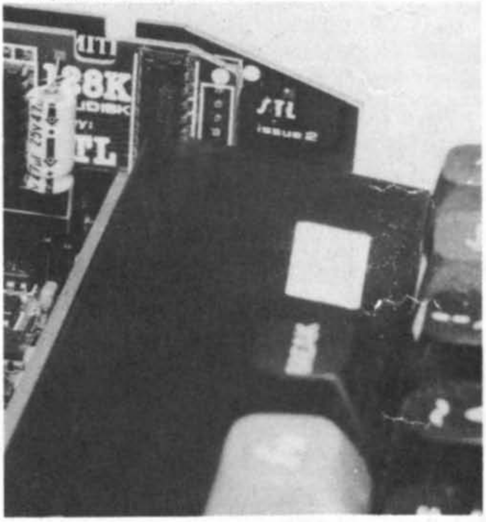

HOW ABOUT COMPATIBILITY?
The Sideways RAM is completely compatible with all issues of BBC computers, disks, all sideways ROMs, second processor, Torch disk pack, Teletext, Econet etc. but NOT with ROM extension boards, since it can replace them.

Its power consumption is so low that you can use it in conjunction with twin disks.

HOW DOES IT WORK?
Occupying the same place as sideways ROMs (such as BASIC, DFS, CPN etc), it is treated like other Sideways ROMs and therefore can replace them.
The Machine Operating System uses Sideways RAMs as naturally as Basic, without procedures or programming rules.
Sideways RAM can run any language, any filing system including Hi-Basic and second processor DFS.

SIDEWAYS RAM POWER IS IN THE SOFTWARE:
Different from Sideways ROMs, Sideways RAM can be written into. This property gives birth to a NEW GENERATION of software for the BBC computer: SERVICE RAMs and VIRTUAL MEMORY PROCESSOR.
Each SERVICE RAM has its own commands and code as its counterpart Sideways ROM but has its own private workspace and storage area thus leaving you with the lowest possible PAGE value (PAGE=&EOO). On the other hand, the Virtual Memory Processor can run huge MACRO BASIC programs (Megabytes are not the limit), keep them on disk and uses the basic 32k of RAM as transient program area. All software for the Sideways RAM system is free.

FREE SOFTWARE?
Solidisk Sideways RAMs is bundled with lots and lots of software, FREE and we mean FREE, now and later. It is quite simple: for every Sideways RAM sold, £1 is spent on MORE software. Sideways RAM users are invited to spot new applications and contributions are rewarded at the usual rate of £1 for every 4 bytes of machine code.
The result is printed on the opposite page.

HOW ABOUT THE FUTURE?
Solidisk Sideways RAM is also widely used in schools for ECONET stations, by professional programmers for writing programs, research laboratories for RAM disk data base, at home for wordprocessing and now even games.
New areas are being developed: Telesoft and Teletext logging, Speech Processor assembler and Relational Data base to cite a few.
As the price of 16k EPROMs are as high as £20 at the present time, more Sideways ROM software publishers will be willing to sell their software on disk. Solidisk will mail FREE OF ANY COST their advertisement to ALL Sideways RAM users providing the price of the Disk version reflects savings in the cost of the ROMs. Solidisk believes that the majority of BBC users will have their Sideways RAM fitted before the end of next year.
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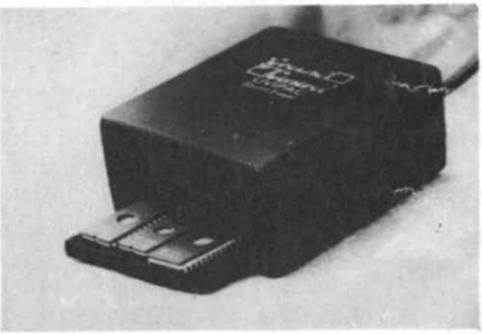

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WHICH SIDEWAYS RAM DO YOU NEED?

Solidisk Sideways RAM is available in 16l (SWR16), equivalent to 1 sideways ROM, 32k (SWR32), equivalent to 2 sideways ROMs, 128k (Solidisk), equivalent to 8 sideways ROMs and the 208k Solidisk equivalent to 12 Sideways ROMs. You can buy a small Sideways RAM now and upgrade it later. From the SWR16 to the SWR32 is by straight exchange, from the SWR32 to the Solidisk is by adding the 96k Solidisk Extension, from 128k to 208k is by exchange of the RAM card.

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WORD 64 is a Service RAM, it uses Solidisk as storage for WORDWISE, up to 64K free characters for any text.

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STLEOO:
STLOO is a Service RAM, it is Disk Filing System that leaves PAGE at &EOO, has built-in disk formatter/verifier and automatic track stepping for 40/80 track disk drives.

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STL150 is a Service RAM to enhance Acorn's .90 DFS to offer up to 150 directory entries per side.

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MACRO-BASIC is a program generator. You use a wordprocessor to create a command file which is then scanned by MACRO. MACRO uses other programs, subroutine libraries, text files (actually any or all files on your disks) as source to generate a bug free BASIC program which can be very large (Megabytes are not the limit).

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VIRTUAL MEMORY PROCESSOR (VMP) uses extensively overlay technique and Solidisk as back store for very large programs that cannot be run otherwise. VMP uses the 32k basic RAM as transient area: it operates on a Main Program as generated by MACRO-BASIC, taking different segments from the Solidisk Store, POOL, HOLD, FREE or CLEAR segments from the transient area. For example: VMP will accept 20 segments of 10k of Basic assembler and assembles it into 16k of machine code.

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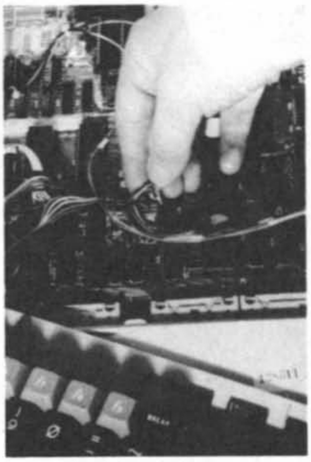

Connect the control wires

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STL320 (2 X 160 tracks, double sided, as above)	£499.00
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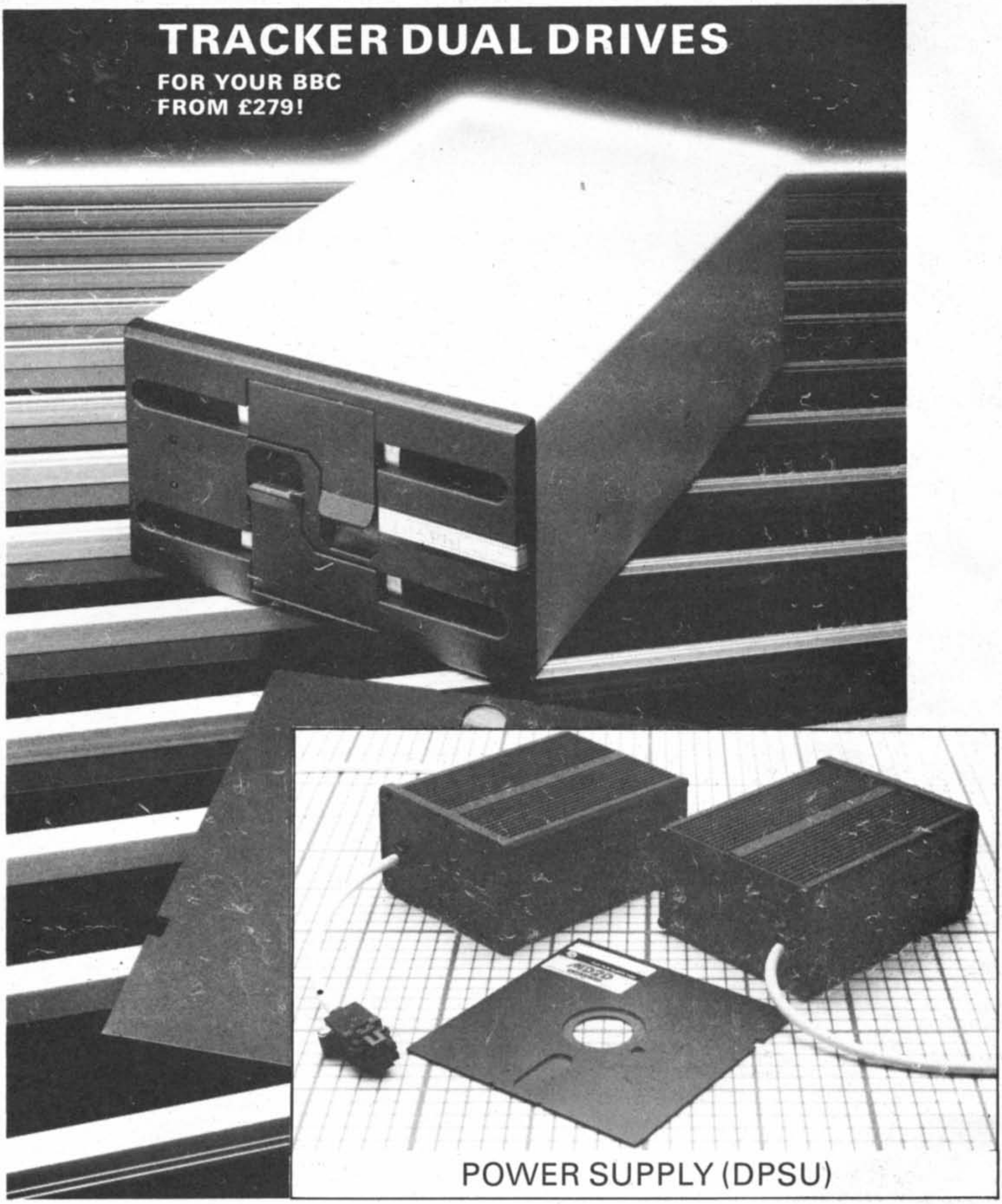

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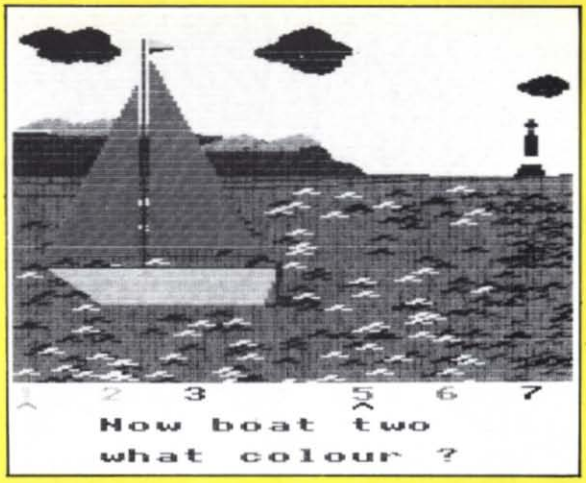

```
1    2    3         5    6    7
^                   ^
   How   boat   two
   what   colour   ?
```

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VARIABLES

a% to g%	Represent either a colour or number chosen.
mx, my etc.	x and y coordinates on graphics screen.
r	Radius
c	Colour of wave
j	Size of loop
e,f,g,i	Tab position on text screen.

PROCEDURES

PROCKEY	Clears text screen and asks for any key to be pressed to go on.
PROCpaint	Sets up colours available with appropriate numbers.
PROCcloud (nx, ny)	Draws and locates clouds.
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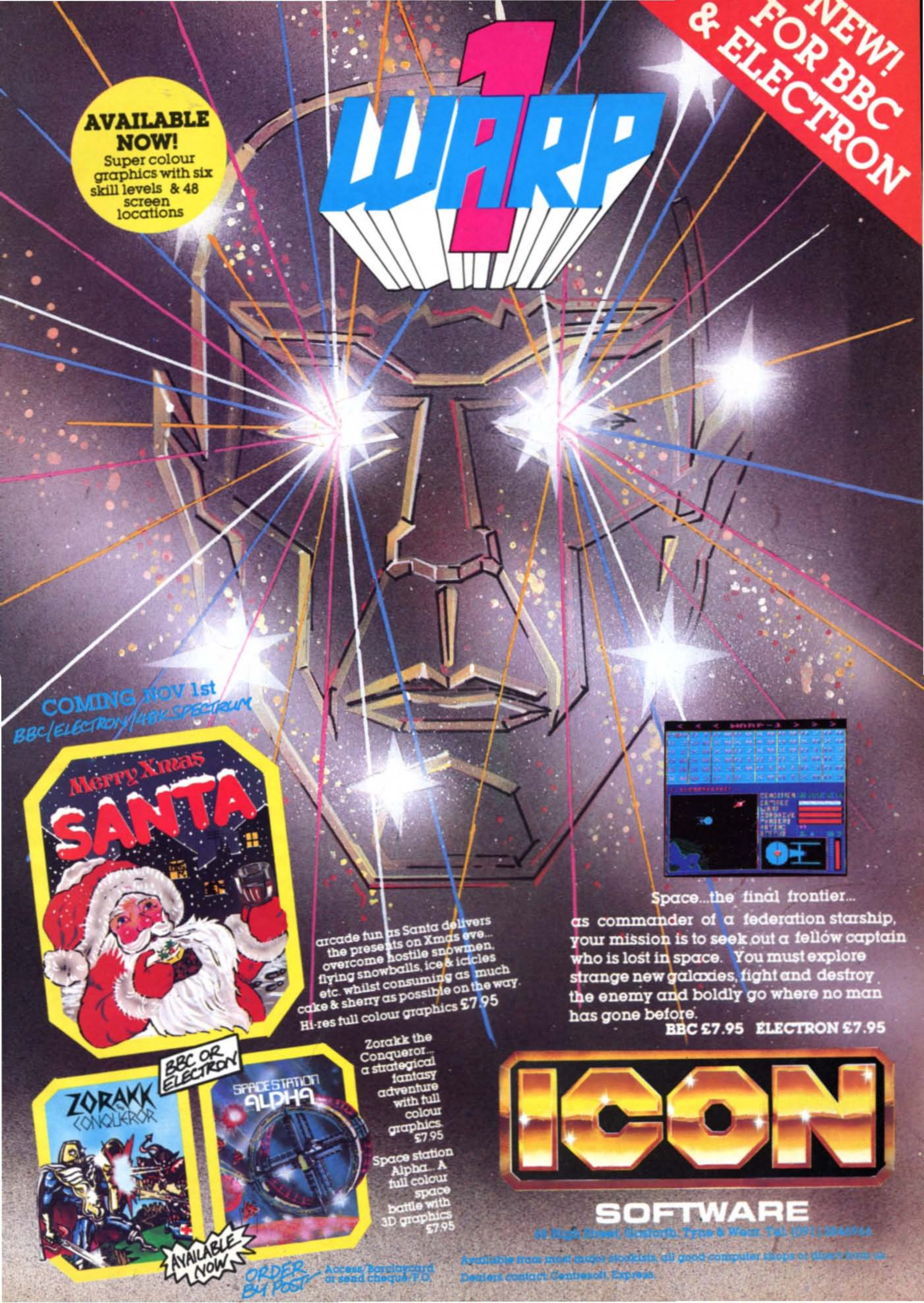
PROCtrees (qx,qy)	Draws and locates trees.
PROCfill (l,j,wx)	Sets up with PLOT77 the loop to colour fill.
PROCdraw	Reads data in blocks of three for MOVE, DRAW or PLOT85 statements.
PROCpaint	Creates and positions pointers for preferred colours on text screen.
PROCcircle (xc, yc, r)	Draws and fills a circle.
PROCboy (xs, ys)	Sets defined characters and locates boy in boat.
PROCbirds	Draws and locates birds.
PROCchara	Defines character for tree and upper cloud.
PROCcharb	Defines character for lower cloud.
PROCstart.	Sets up graphics and text screens.

By LEN SCOTT

```
   5 REM (C) The Micro User
  10 MODE7
  15 VDU23;8202;0;0;0;
  20 PRINT TAB(5,2);CHR$(131);CHR$(1
41);"SHALL WE DRAW A PICTURE"
  30PRINT TAB(5,3);CHR$(131);CHR$(14
1);"SHALL WE DRAW A PICTURE"
  40 PRINT TAB(2,7);CHR$(131);CHR$(1
41);"A SERIES FOR CHILDREN AGE 4 TO 7
"
  50 PRINT TAB(2,8);CHR$(131);CHR$(1
41);"A SERIES FOR CHILDREN AGE 4 TO 7
"
  60 PRINT TAB(2,13);CHR$(131);CHR$(
141);"  NUMBER TWO A SAILING BOAT"
  70 PRINT TAB(2,14);CHR$(131);CHR$(
141);"  NUMBER TWO A SAILING BOAT"
  80 PRINT TAB(7,20)"written by Len
Scott"
  90 PROCKEY
 100 PRINTTAB(8,8)"NOTE TO TEACHER"
 110 PRINTTAB(2,10)"When a selection
 of colour is"
 120 PRINTTAB(2,11)"asked for the ch
ildren can choose"
 130 PRINTTAB(2,12)"any number from
1 to 9 .The"
 140  PRINTTAB(2,13)"alternatives of
fered are only in"
 150 PRINTTAB(2,14)"my opinion the b
est combination"
 160 PROCKEY
 170 MODE 2
 175 VDU23;8202;0;0;0;
 180 PROCstart
 190 PROCpaint
```

Turn to Page 169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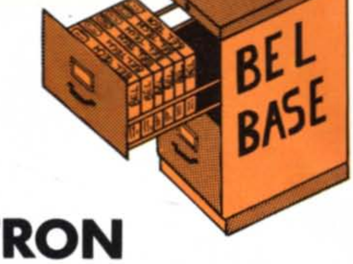

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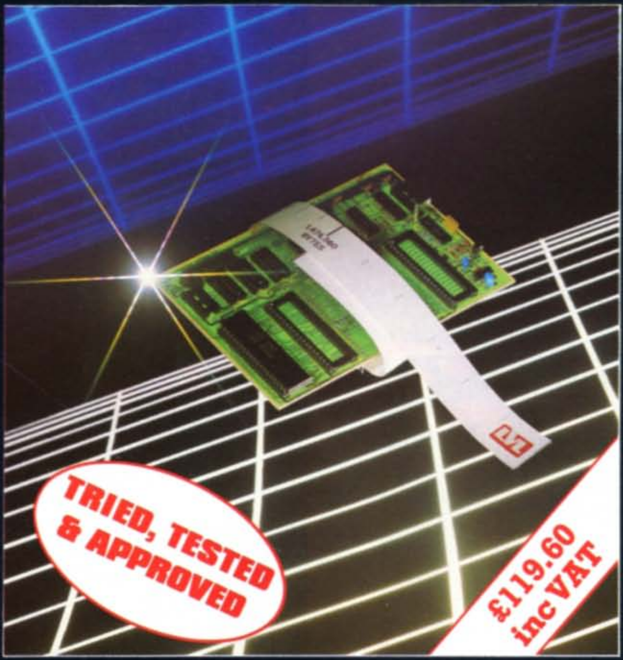

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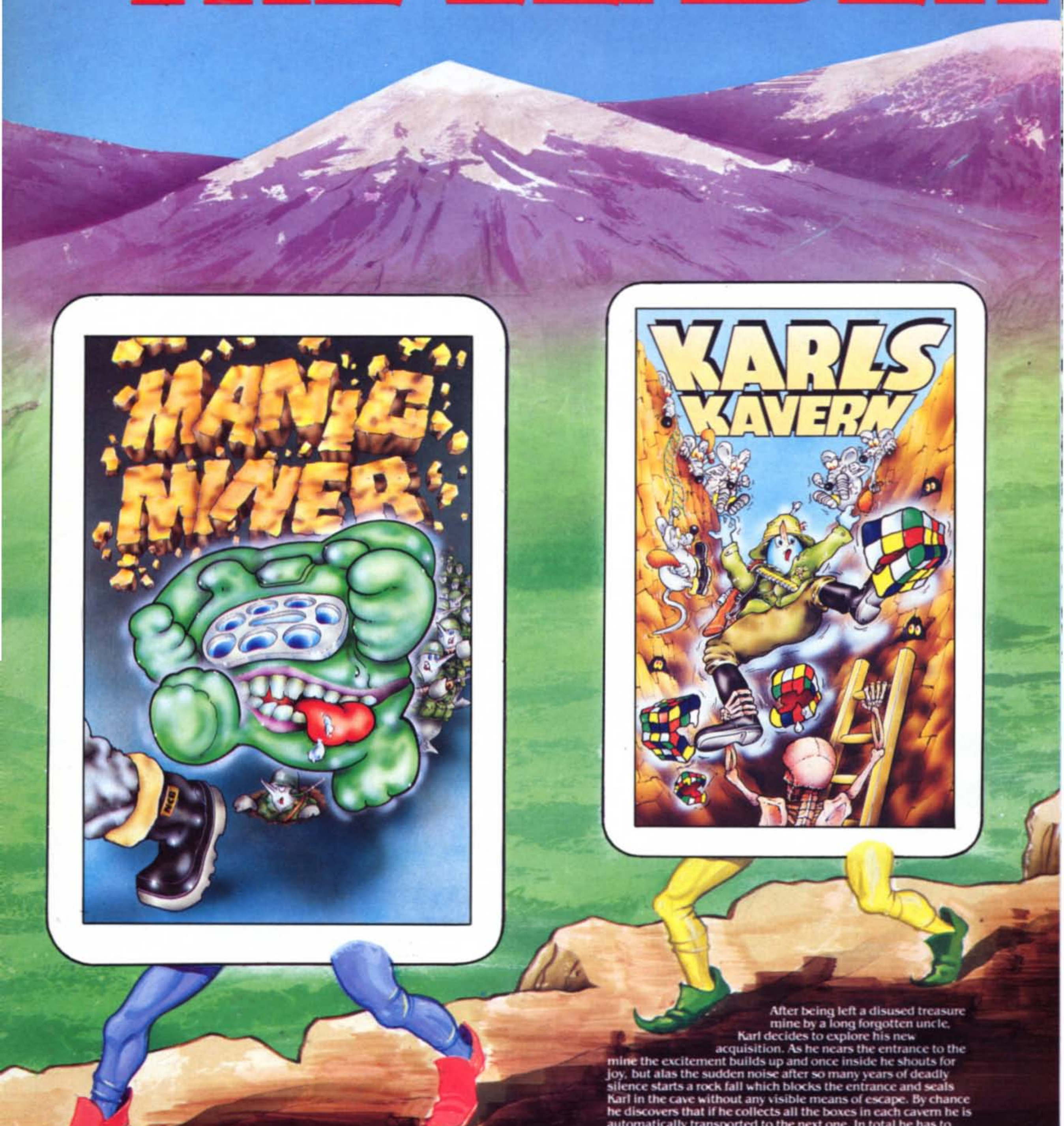

Miner Willy, while prospecting down Surbiton way, stumbles upon an ancient long forgotten mine-shaft. On further exploration, he finds evidence of a lost civilisation far superior to our own, which used automatons to dig deep into the earth's core to supply the essential raw materials for their advanced industry. After centuries of peace and prosperity, the civilisation was torn apart by war, and lapsed into a long dark age, abandoning their industry-and machines. Nobody, however, thought to tell the mine robots to stop working, and through countless aeons they had steadily accumulated a huge stockpile of valuable metals and minerals, and Miner Willy realises that he now has the opportunity to make his fortune by finding the underground store.

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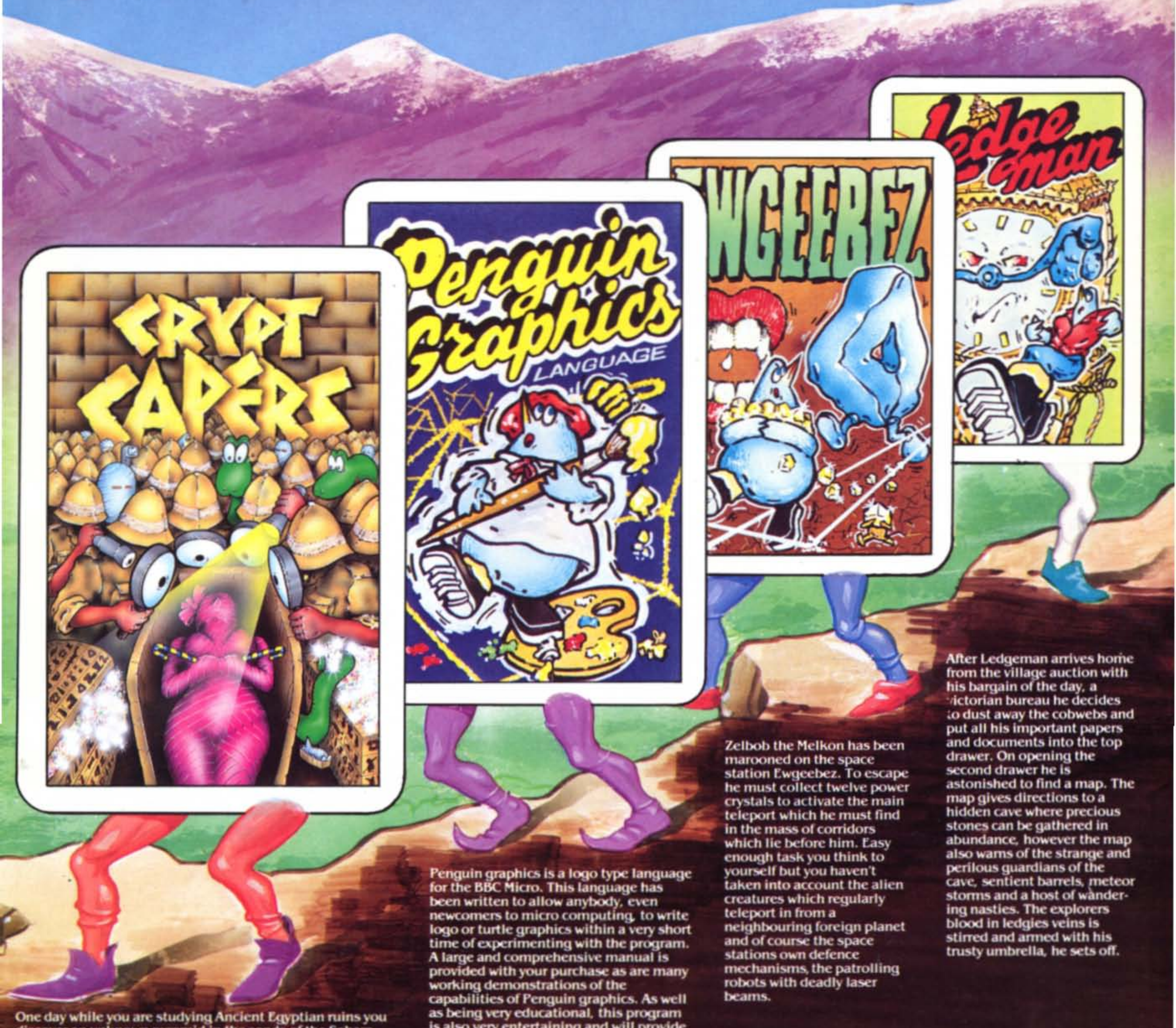

One day while you are studying Ancient Egyptian ruins you discover an unknown pyramid in the sands of the Sahara. Once inside you are standing in a chamber containing several treasures, perhaps you would wish that there were not as many snakes and fireballs around. To get deeper into the pyramid you must collect the keys you find and unlock the doors. Beware of the Triads and shrinking ghosts. Anyhow you have your gun and it should not be impossible to reach the Pharoahs chamber on level 12. On your way you will find old jars, statues, papyrus roots and other valuable items. Remember do not stand in the way of the magic non destructable rocks or you might end up being a surprise find for archaeologists in a few thousand years from now.

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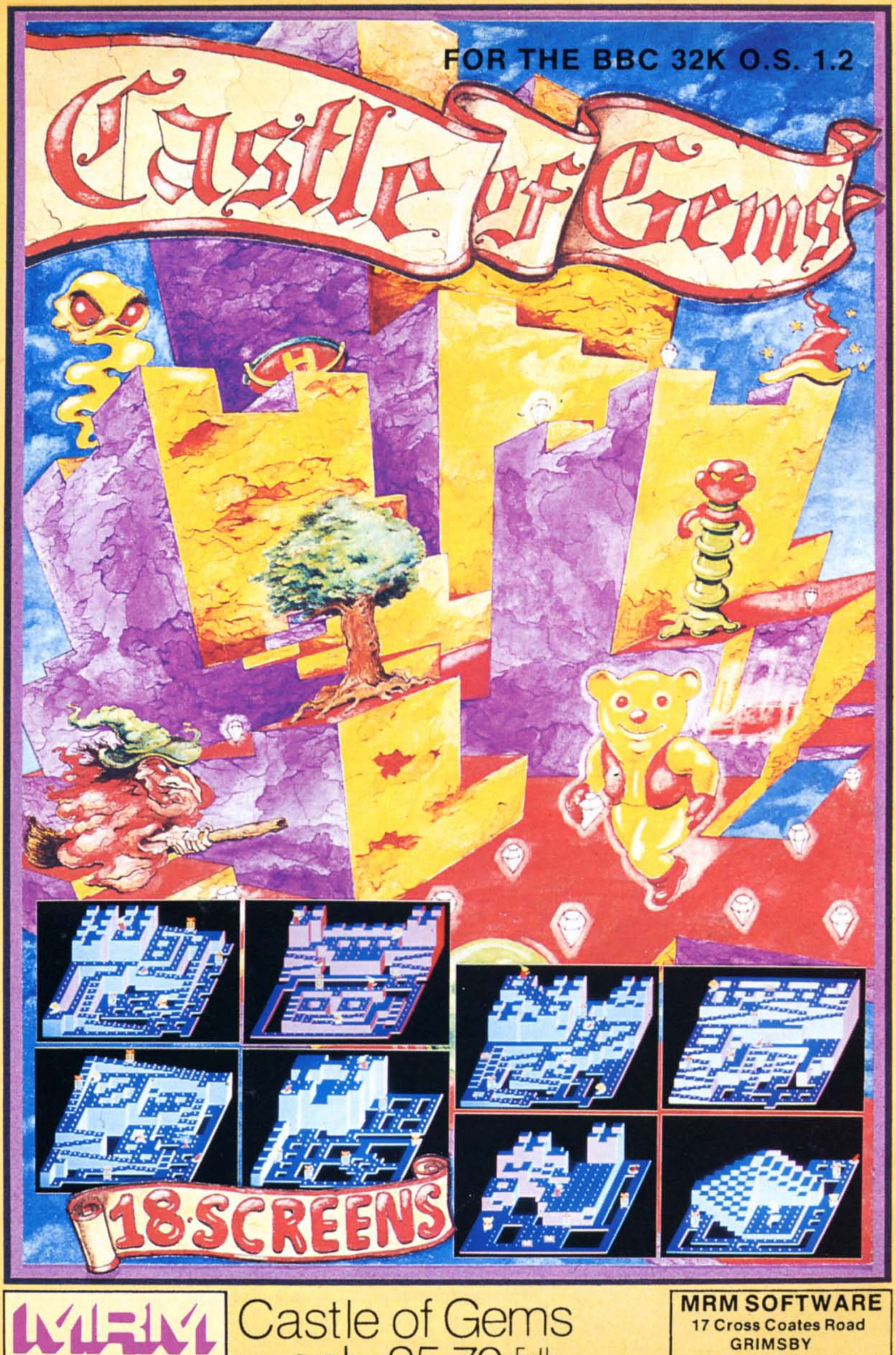
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Let your macros do the talking

Part III of PETER JOHNSON's examination of the extra instruction set available on the second processor

THE HIBASIC that comes with the BBC Micro's second processor is a version of Basic specially written for machines being exported to the USA. It is assembled to run at &B800 and to list COLOR as COLOUR (try it!).

As it is intended for NMOS machines only – such as the second processor is – in order to use the enhanced 65C02 codes it is necessary to resort to poking them into the program with the EQUB and EQUW pseudo-operations.

Here I describe two ways of doing this, a simplistic one and a more sophisticated method which produces properly formatted listings.

The first method simply involves defining a lot of constants, which are the opcodes of the new instructions, and using EQUB to insert them into the program.

Operands may be inserted with EQUB or EQUW, depending on their length. Some of the operations don't have any operand bytes, so only need the initial EQUB.

Here is an example of the swap X and Y sequence given earlier. This is particularly straightforward as all the instructions are implied addressing mode ones:

```
100 phy=&5A : ply=&7A
110 phx=&DA : plx=&FA
120 FOR pass=0 TO 3 STEP 3
130 P%=&3000 : REM or whatever
140 [ OPT pass
150 .code    \ lots of code
160 \ ......
170 .swapxy EQUB phy
180 EQUB phx
190 EQUB ply
200 EQUB plx
210 \.......
220 ]
230 NEXT pass
```

A more meaty example would be to go through 16 bytes of memory, zeroing each byte if both bits 6 and 7 are set, while preserving the accumulator.

This would be written:

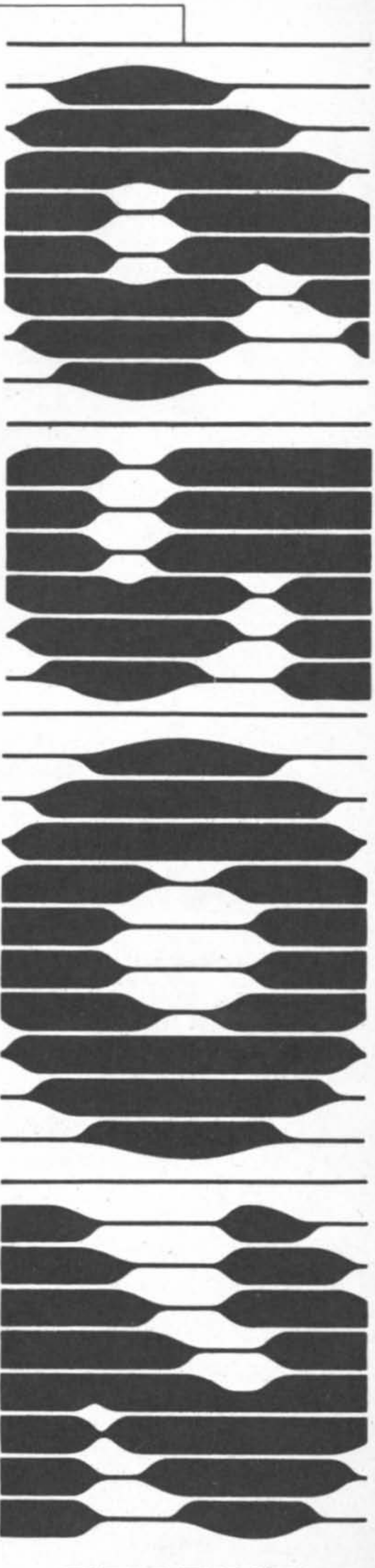
```
      LDX #15       \ Do sixteen
                      bytes
.loop BIT table,X   \ Get state of N
                      and V
      BVC miss      \ V=0 so ignore
      BPL miss      \ N=0 so ditto
      STZ table,X   \ Zero the byte
.miss DEX           \ next byte
      BPL loop
      ......
.table
```

To translate this into Basic we need the codes of BIT abs,X and STZ abs,X (we assume that the table is not in zero page). The program to assemble this code is:

```
100 bitax=&3C : stzax=&9E
110 FOR pass=0 TO 3 STEP 3
120 P%=&3000 : REM or whatever
130 [ OPT pass
140 LDX #15
150 .loop EQUB bitax : EQUW table
160 BVC miss
170 BPL miss
180 EQUB stzax : EQUW table
190 .miss DEX
200 BPL loop
210 \ ......
220 .table
230 ]
240 NEXT pass
```

As a final example of this technique the BRA instruction is illustrated. This

→



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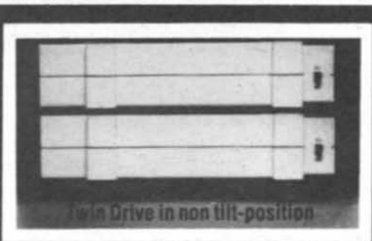
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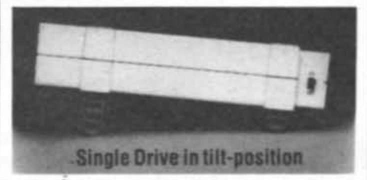
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From Page 135

is slightly different to the previous examples as the operand must be calculated from the destination label.

Consider the segment of code:

```
65C02
      BRA end
/......
/......
.end RTS
```

To translate this into a form the HiBasic assembler can use we first have to assign a constant *bra* with a value &80. (I use lower case for the opcode variables throughout this article, as mnemonics such as AND are illegal variable names.)

The code to perform the branch listed above is:

```
6502
   EQUB bra : EQUB end-(P%+1)
/......
/......
.end RTS
```

The expression *end-(P%+1)* is derived as follows: The operand of branch instructions is the displacement from the first byte of the instruction after the branch to the destination address.

When the expression after the second EQUB above is being calculated *P%* contains the address of this EQUB. Thus *P%+1* is the address of the instruction after the branch, and *end-(P%+1)* is the required difference. Simple, huh.

Note that the form *label-(P%+1)* is used even if "label" comes before the branch in the program. The expression will yield the necessary negative displacement.

A shortcoming of the current method is that "Out of range" errors are not detected. This is corrected in the longer version of BRA described below.

The techniques just described for implementing the 65C02 codes are serviceable but have a couple of shortcomings. One is that in assembly listings the new instruction is split over two lines if it has an operand.

The other problem is the lack of error detection in the BRA instruction, and in instructions that need a single-byte operand.

A way of eliminating these shortcomings is to define the 65C02 instructions as short macros. A macro in assembler parlance is a pseudo-instruction which, when called, generates several real instructions.

In BBC assembler the OPT directive is used too in conjunction with user-defined functions to emulate a macro facility. (EQUS can also be used, but is less convenient to use when trying to control the assembly listing).

To introduce the idea of macros a simple example will be presented, followed by details of the macros required to emulate 65C02 instructions.

It is quite common to find the sequence:

```
6502
        LDA  code
        LDX  address MOD &100
        LDY  address DIV &100
```

in BBC assembler programs, for example, when calling the MOS routines OSFIND, OSFILE and OSWORD. Wouldn't it be convenient if we had an instruction to do this in one go? Like this:

```
LDREG code, address
```

This would save us the trouble of remembering the order of the MOD, DIV and so on. A macro may be written to do this for us:

```
6502
        OPT FN1dreg(code, address)
/.....
/.....
]
NEXT
REM......
END
DEF FN1dreg(code, address)
[       OPT pass
        LDA  code
        LDX  address MOD &100
        LDY  address DIV &100
]
=pass
```

The OPT is used purely as a way to call FN1dreg. It has the useful property that it generates no code, and so doesn't interfere with the program. When the OPT is encountered Basic calls FN1dreg in order to evaluate the operand. In FN1dreg we have more assembly code, in fact the very same code that was given earlier.

So the net effect of all this mucking around with functions and OPTs is to generate the code we first thought of.

However the utility of having macros becomes apparent when they are called numerous times in the program. Each time this happens only the OPT line has to be typed. This saves time and reduces the possibility of typing errors.

Having followed this far you may have realised how macros can help in the implementation of 65C02 instructions. Here is the macro definition of the JMP (abs,X) instruction:

```
6502
DEF FNjmpax(addr)
[       OPT pass
        EQUB &7C : EQUW addr
]
=pass
```

To do JMP (table,X), the instruction OPT FNjmpax(table) would be used.

The real power of macros isn't illustrated in the example above. Since the FN call has handed control temporarily back to Basic from the assembler, we can do useful things inside the function definition such as error checking and performing a "listing" of the instruction.

Look at the new version of FNjmpax:

```
 1000 DEF FNjmpinx(addr)
 1010 [OPT pass AND 6
 1020 EQUB &7C : EQUW addr
 1030 ]
 1040 IF (pass AND 1)=0 THEN =pass AN
D 6
 1050 PRINT FNhex4(P%-3)FNhex2(&7C)FN
hex2(addr);
 1060 PRINT FNhex2(addr DIV &100)SPC(
10)"JMP (&"FNhex4(addr)",X)"
 1070 =pass AND 6
```

The code is assembled in the same way as the last example, but the assembly listing is suppressed by

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In taking up the challenge you have to find the TALISMAN and locate a pentagram which then has to be prepared for the final rite. In the mean time dark forces will be opposing you making a difficult task almost impossible.

Do not allow yourself to the lulled into a sense of security for it will be short lived.

Many have gone before only to swell the ranks of the damned.

This is the latest adventure from the stables of Microtest and has been written with the acclaimed features of other adventures in mind eg save facility, quick response, simple but extensive commands, a mixture of logical and fiendish problems to solve.

Be warned this is an easy adventure to get into but devilishly difficult to end.

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Typing '*HELP FONTS' gives a list of available fonts and the blocks of characters which they replace.

Available fonts are:

•Accents	Accents and miscellaneous.
•Block	Small capitals.
•Data	Like the bottoms of cheques.
•Greek	It's all Greek to me too!
•Joined	Standard capitals with joined up lower case.
•Maths	A mix of until now unobtainable Mathematical symbols.
•Miscellaneous	A few oddities which often are very necessary.
•Thick	Thick text (for MODEs 0&3) to enhance 80 column mode.
•Thin	Thin text (for MODEs 2&5) which makes modes 2 & 5 much more readable or perhaps "READABLE".
•Vertical	For labelling graphs.
•MODE 8	Ten column multicolour, memory-miserly mode.
•S DUMP	A dump facility which will produce a screen dump of any MODE from 0 to 8 (including a text only dump in MODE 7) on an Epson, Star, CTI CP80 or MT80.

The ROM uses absolutely NO user memory and can be used with word processors etc. as well as normal BASIC programs. The DUMP utility will produce positive or negative graphics and will also rotate the picture produced through 90° as well as being able to position the picture anywhere laterally across the sheet of paper.

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This enables you to plug the Rapid action self centring joysticks until now only available for the Spectrum/Atari/CBM machines into the user port of the BBC. Model A users please note NO ANALOGUE INTERFACE REQUIRED.

Disc Users Note – pressing BREAK, SHIFT-BREAK or CONTROL BREAK does not modify or destroy the STARSTICK software so Disc Users please feel free to Boot!

The software patch provided in the ROM is interrupt driven and adds the following commands to your computer.

- ★ STICK turn on the STARSTICK ROM
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- ★ SETSTICK set up joystick to users spec
- ★ SAVE "NAME" 140 160 saves your user-key protocols
- ★ ADVAL emulate standard analogue joysticks
- ★ PAUSE define key to Freeze game
- ★ NPAUSE turn off ability to freeze game
- ★ "NAME" predefined key protocols set up for software houses programs
- ★ HELP KEYS displays currently selected key protocols
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Access

Large picture shows BBC Computer System and a Quickshot II Joystick. Small inset just a few of the joysticks that will work with the patch lead. Screenshot by kind permission of SUPERIOR SOFTWARE

All MICROTEST ROMs are fully TUBE® compatible. (TUBE® is a reg. trademark of Acorn Computers).

From Page 137

masking out the lowest bit of the pass number. The IF returns immediately if no listing is required.

If the lowest OPT bit is set the PRINT statements give a listing compatible with that produced by the assembler. The functions FNhex2 and FNhex4 are assumed to return strings of their arguments in hex with leading zeroes and a trailing space.

To use the macro defined earlier, a sequence of the form:

```
6502
OPT FNjmpinx(&1234) : OPT pass
```

would be used. The second OPT is needed as FNjmpax turns off the listing in order to suppress the first OPT.

If pass equalled 3, this listing would be given:

```
3000 7C 34 12    JMP (&1234, X)
3003             OPT pass
```

Rather than bore the reader with more tedious examples, I present below the complete suite of macros implementing the 65C02 additional instructions. The techniques involved are identical to the one described above, and the macros are called in the same way.

```
   10 REM  Definitions of 65C02 opcod
es, early in the program
   20 bra=&80
   30 oraInd=&12 : andInd=&32 : eorIn
d=&52 : adcInd=&72
   40 staInd=&92 : ldaInd=&B2 : cmpIn
d=&D2 : sbcInd=&F2
   50 tsbZp=&04  : tsbAbs=&0C : trbZp
=&14  : trbAbs=&1C
   60 bitZpx=&34 : bitAx=&3C  : bitIm
m=&89
   70 stzZp=&64  : stzAbs=&9C : stzZp
x=&74 : stzAx=&9E
   80 jmpInx=&7C
   90 incA=&1A   : decA=&3A   : phy=&
5A   : ply=&7A
  100 phx=&DA    : plx=&FA
  110 FOR pass=0 TO 3 STEP 3
  120  P%=&3000
  125 [OPT pass
  126 \ For example
  127  OPT FNjmpInx(table)
  128  OPT FNdecA
  129  OPT FNstaInd(&70) : OPT pass
  130  RTS
  131 .table
  140 ]
  150 NEXT
  160 END
10000 DEF FNbra(addr)
10010 disp%=addr-(P%+2)
10020 [ OPT pass AND 6
10030   EQUB bra : EQUB disp%
10040 ]
10050 IF pass AND 2 AND (disp%<-128 O
R disp%>127) THEN PRINT"Out of range"
:STOP
10060 IF pass AND 1 THEN PRINT FNhex4
(P%-2)" "FNhex2(bra)" "FNhex2(disp%)S
TRING$(14," ")"BRA &"FNhex4(addr)
10080 =pass AND 6
10090
10100 DEF FNoraInd(addr)=FNind(addr,o
raInd,"ORA")
10110 DEF FNandInd(addr)=FNind(addr,a
ndInd,"AND")
10120 DEF FNeorInd(addr)=FNind(addr,e
orInd,"EOR")
10130 DEF FNadcInd(addr)=FNind(addr,a
dcInd,"ADC")
10140 DEF FNstaInd(addr)=FNind(addr,s
taInd,"STA")
10150 DEF FNldaInd(addr)=FNind(addr,l
daInd,"LDA")
10160 DEF FNcmpInd(addr)=FNind(addr,c
mpInd,"CMP")
10170 DEF FNsbcInd(addr)=FNind(addr,s
bcInd,"SBC")
10180
10200 DEF FNind(addr,opcode,mnem$)
10220 [ OPT pass AND 6
10230   EQUB opcode : EQUB addr
10240 ]
10250 IF pass AND 2 AND addr>&FF THEN
 PRINT"Byte":STOP
10260 IF pass AND 1 THEN PRINT FNlist
1(P%-2,opcode,addr,mnem$+" (")")"
10270 =pass AND 6
10280
10290 DEF FNtsbZp(addr)=FNzp(addr,tsb
Zp,"TSB")
10300 DEF FNtsbAbs(addr)=FNabs(addr,t
sbAbs,"TSB")
10310 DEF FNtrbZp(addr)=FNzp(addr,trb
Zp,"TRB")
10320 DEF FNtrbAbs(addr)=FNabs(addr,t
rbAbs,"TRB")
10330 DEF FNstzZp(addr)=FNzp(addr,stz
Zp,"STZ")
10340 DEF FNstzAbs(addr)=FNabs(addr,s
tzAbs,"STZ")
10350
10360 DEF FNzp(addr,opcode,mnem$)
10380 [ OPT pass AND 6
10390   EQUB opcode : EQUB addr
10400 ]
10410 IF pass AND 2 AND addr>&FF THEN
 PRINT"Byte":STOP
10420 IF pass AND 1 THEN PRINT FNlist
1(P%-2,opcode,addr,mnem$+" ")
10430 =pass AND 6
10440
10450 DEF FNabs(addr,opcode,mnem$)
10470 [ OPT pass AND 6
10480   EQUB opcode : EQUW addr
10485 ]
10490 IF pass AND 1 THEN PRINT FNlist
2(P%-3,opcode,addr,mnem$+" ")
10500 =pass AND 6
10510
10520 DEF FNbitZpx(addr)=FNzpx(addr,b
itZpx,"BIT")
10530 DEF FNbitAx(addr)=FNax(addr,bit
Ax,"BIT")
10540 DEF FNstzZpx(addr)=FNzpx(addr,s
tzZpx,"STX")
10550 DEF FNstzAx(addr)=FNax(addr,stz
Ax,"STX")
10551
10552 DEF FNbitImm(val)
10553 [ OPT pass AND 6
10554   EQUB bitImm : EQUB val
10555 ]
10556 IF pass AND 2 AND val>&FF THEN
PRINT"Byte":STOP
10557 IF pass AND 1 THEN PRINT FNlist
1(P%-2,bitImm,val,"BIT #")
10558 =pass AND 6
10560
10570 DEF FNzpx(addr,opcode,mnem$)
10590 [ OPT pass AND 6
10600   EQUB opcode : EQUB addr
10610 ]
```

→

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```
10620 IF pass AND 2 AND addr>&FF THEN
 PRINT"Byte":STOP
10630 IF pass AND 1 THEN PRINT FNlist
1(P%-2,opcode,addr,mnem$+" ")",X"
10635 =pass AND 6
10640
10650 DEF FNax(addr,opcode,mnem$)
10670 [ OPT pass AND 6
10680   EQUB opcode : EQUW addr
10690 ]
10700 IF pass AND 1 THEN PRINT FNlist
2(P%-3,opcode,addr,mnem$+" ")",X"
10710 =pass AND 6
10720
10730 DEF FNjmpInx(addr)
10750 [ OPT pass AND 6
10760   EQUB jmpInx : EQUW addr
10770 ]
10780 IF pass AND 1 THEN PRINT FNlist
2(P%-3,jmpInx,addr,"JMP (")",X)"
10790 =pass AND 6
10800
10810 DEF FNincA=FNimp(incA,"INC A")
10820 DEF FNdecA=FNimp(decA,"DEC A")
10830 DEF FNphy=FNimp(phy,"PHY")
10840 DEF FNply=FNimp(ply,"PLY")
10880 DEF FNphx=FNimp(phx,"PHX")
10890 DEF FNplx=FNimp(plx,"PLX")
10900
10910 DEF FNimp(opcode,mnem$)
10930 [ OPT pass AND 6
10940   EQUB opcode
10950 ]
10960 IF pass AND 1 THEN PRINT FNlist
0(P%-1,opcode,mnem$)
10970 =pass AND 6
10980
10990 DEF FNlist0(p%,opcode,mnem$)
11000 =FNhex4(p%)+" "+FNhex2(opcode)+
STRING$(17," ")+mnem$
11010
11020 DEF FNlist1(p%,opcode,addr%,mne
m$)
11030 =FNhex4(p%)+" "+FNhex2(opcode)+
" "+FNhex2(addr%)+STRING$(14," ")+mne
m$+"&"+FNhex2(addr%)
11040
11050 DEF FNlist2(p%,opcode,addr%,mne
m$)
11060 =FNhex4(p%)+" "+FNhex2(opcode)+
" "+FNhex2(addr%)+" "+FNhex2(addr%DIV
&100)+STRING$(11," ")+mnem$+"&"+FNhex
4(addr%)
11070
11080 DEF FNhex2(h%)=RIGHT$("0"+STR$~
(h%),2)
11090 DEF FNhex4(h%)=RIGHT$("000"+STR
$~(h%),4)
11100
11110 DEF PROCerror(err$) PRINT'err$'
:END
```

This listing is included in this month's cassette tape offer. See order form on Page 213.

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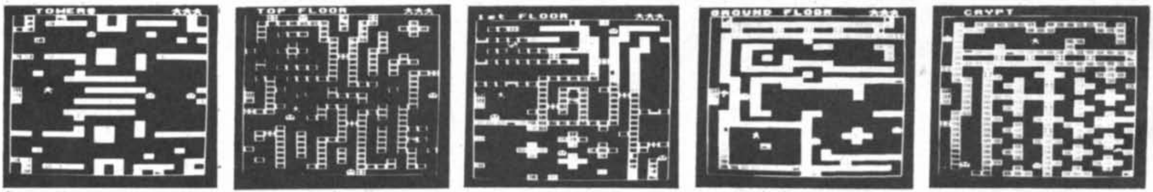

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A) MICKEY THE MONKEY and his apple tree make subtraction fun.
B) COLOUR BLOCKS bring sizes and colour into perspective.
C) MERRY MUSIC turns the keyboard into a musical keyboard.
D) FUNNY FACES presents a line up, which one is the suspect?
E) FRED THE FROG needs co-ordinated help to get across the pond.

EARLY YEARS 2

A) THE POND seems very active today
B) SPEED is required to keep the cake on the conveyor belt.
C) DIRECTIONS seem to be needed by everyone in Orion village.
D) ORDER the blocks.
E) SID THE SPIDER needs some help to get out of the maze.

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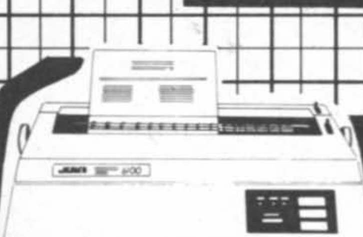

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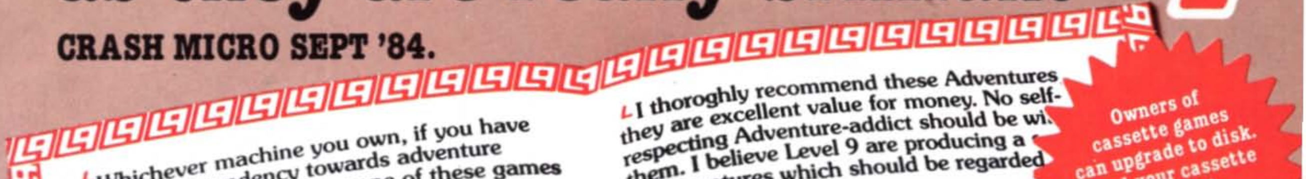


Whichever machine you own, if you have the vaguest tendency towards adventure playing then you must try one of these games (unfortunately you'll probably end up wanting to buy the lot!).

Computing Today, August 84

To me, all Level 9 adventures create a remarkable atmosphere because the descriptions sound so life-like. This is where so many other adventures fail.

Crash, July 84

But it's not just the size of the game it's the quality as well that is astonishing … … scenes to fire the imagination.

PCG, April 84

As in all Level 9's adventures, the real pleasure comes not from scoring points but in exploring the world in which the game is set and learning about its denizens.

Which Micro?, February 84

(LORDS OF TIME). As we have come to expect from Level 9, the program is executed with wonderful style . . . Highly recommended.

PCW, 1 February 84

I thoroghly recommend these Adventures they are excellent value for money. No self-respecting Adventure-addict should be wi… them. I believe Level 9 are producing a … of Adventures which should be regarded classics.

Atari User,

These programs run very fast and the… no frustrating pauses. Level 9 Adventures superbly designed and programmed, the contents first rate. The implementation of Colossal Adventure is nothing short of brilliance; rush out and buy it. While you're at it, buy their others too. Simply smashing!

Your 64, June 84

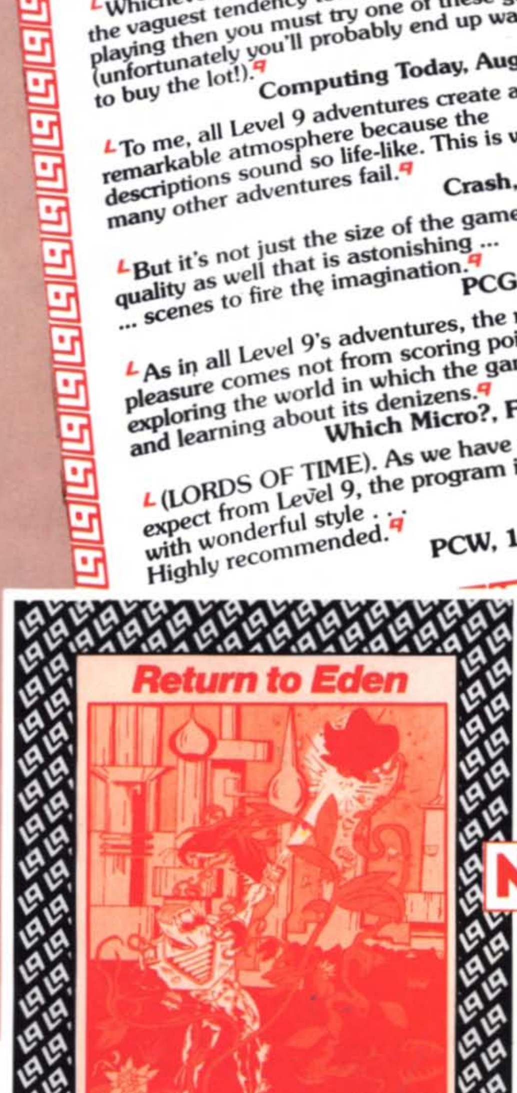
Level 9 — arguably the producer of the best adventure games in the UK — has done it again. LORDS OF TIME is a sparkling addition to its stable of winners.

Acorn User, July 84

(SNOWBALL). This is another imaginative, massive-scaled immensely enjoyable adventure from those experts down at Level 9 Computing.

Your Computer, March 84

Owners of cassette games can upgrade to disk. Send your cassette to us with £2.50 to cover costs.



Level 9's epic adventures are now here for the AMSTRAD. Disk versions are available for the BBC (40/80 track) and Commodore 64. And, best of all, RETURN TO EDEN is ready. It's been a busy month!

NEW

RETURN TO EDEN is the long-awaited sequel to Level 9's top-selling Snowball adventure. Now it's here with 220 locations, masses of puzzles, and with pictures on the CBM and Spectrum versions.

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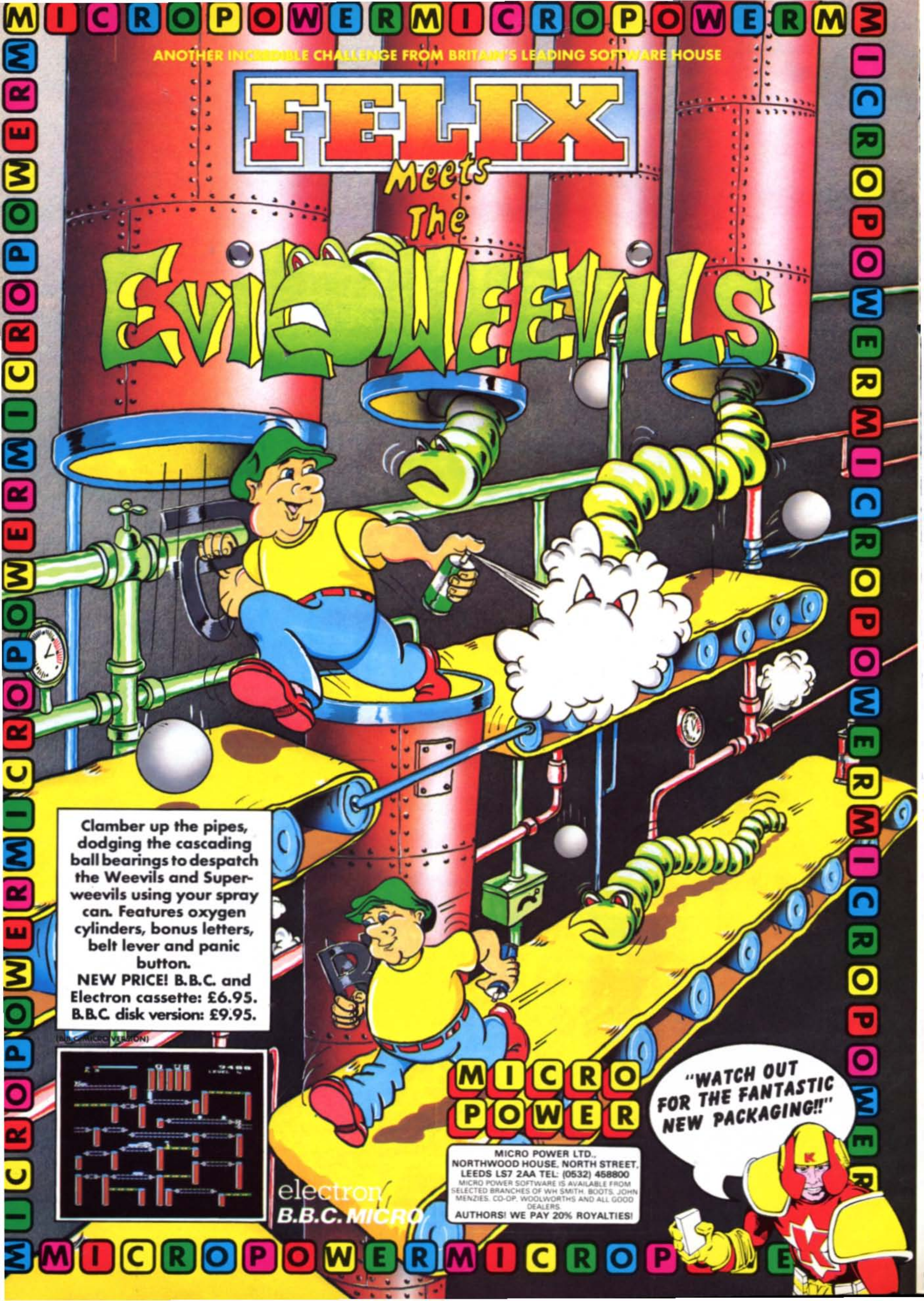
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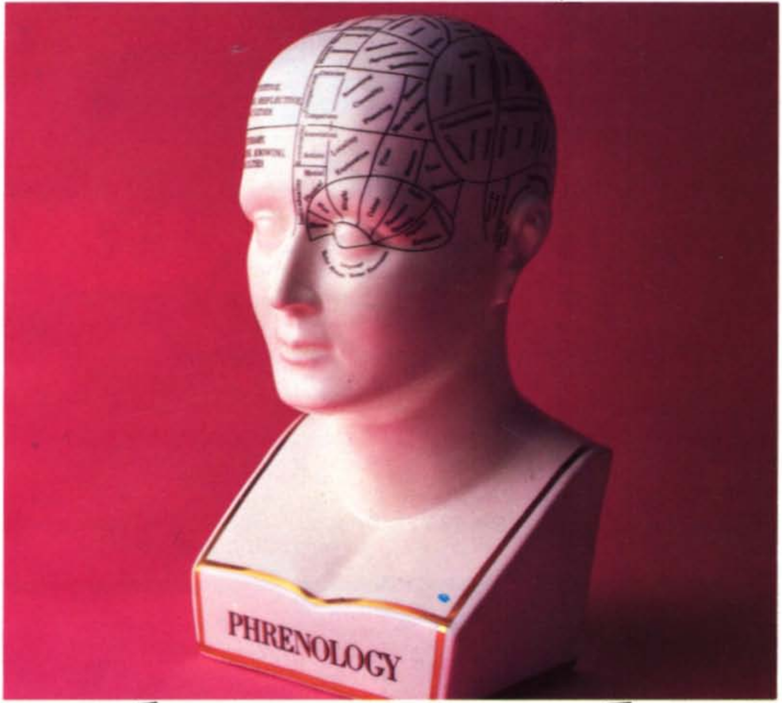

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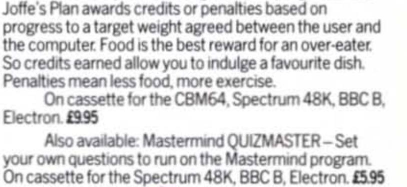

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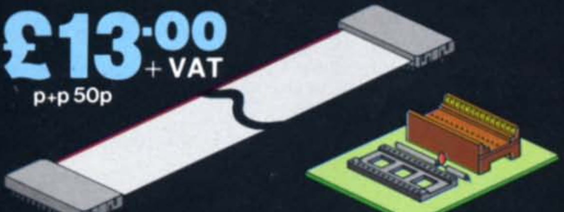

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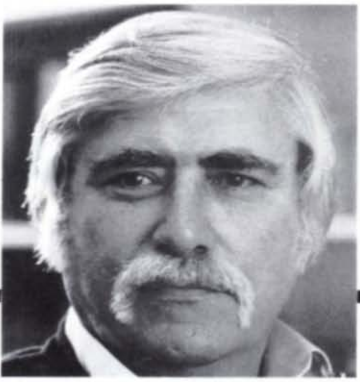

Harold Rules..OK?

When you call please don't disturb Harold — he broke 1000 on Snapper last week and hopes to crack 2000 soon. Mind you, there are other machines in the store that you can use to try out the software from our extensive range. Printers, disc drives and monitors too.

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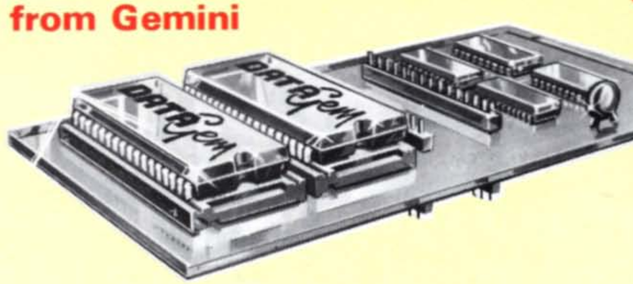
WIN this ROM based database from Gemini



PRIZES for this month's competition are three Datagems, the new ROM-based database from Gemini Marketing.

The 24k random access management system is housed in a carrier board which is simple to install inside the micro – switch on and you're away!

A database is a technical term for what is essentially a computerised card index system. Any application suitable for such a system – and there are literally thousands – could be implemented on Datagem.

And because the information is being stored in your BBC Micro, the package uses its tremendous speed and computing power to incorporate various time and labour-saving facilities far beyond the limits of any manual filing system.

Designed for disc-based systems, Datagem allows you to create files of up to 5,100 user definable records which you can extend, delete, and edit at will. You can even exchange information with the popular Wordwise and View word processors.

In addition, Datagem can be used to produce standard but personalised letters to large groups of people meeting specific requirements. Further options are contained within the software for searching, sorting and printing.

As you can see the potential is quite enormous. So why not try and win one for yourself?

The competition is not difficult – all you need is a sense of humour – and we know from experience that our readers have plenty of that!

The photograph you see below was taken from a local news item at the time of the Manchester Electron and BBC Micro User Show in September.

The story accompanying the photograph told of the Bibby twins, Mike and Pete, features editors of *The Micro User* and *Electron User* respectively, and how their identical appearances caused problems for everyone they met. (The real cause of these problems must remain a closely guarded secret.)

To celebrate the arrival of the show it was decided that one of them must remove his hirsute appendage. Mike, as courageous as ever, did what you would expect any man to do in his position: he chickened out at the last minute.

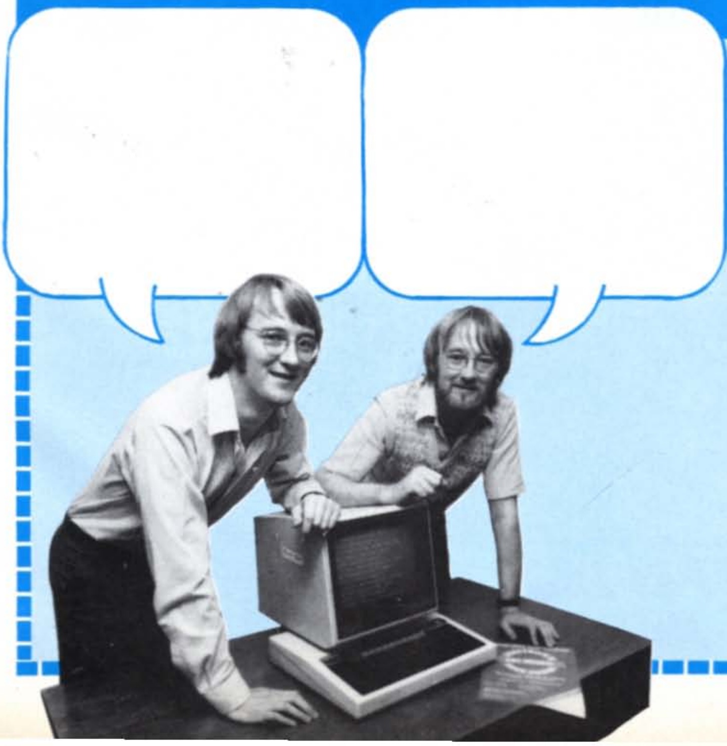
It took four of us to hold him down while Barry Wood did the dirty deed. He was then, and is now, as clean shaven as the day he was born.

He certainly looks happy enough in the photograph, and we're sure that at the time he was telling Pete how much he enjoyed his new looks.

Perhaps you know better? All you have to do is supply the conversation by inserting the missing words in the bubbles – the most amusing and imaginative entries win.

No more than 20 words from each twin please, and keep them printable – the lads are renowned for their delicacy . . .

WINNERS of the competition in the August ***Micro User*** *were R. Hersee, Tallington, Lincs; P. Geertsen, Horsholm, Denmark; and R.L. Godfrey, Godalming, Surrey. Their Ultradrives are on the way to them.*



Your FREE entry form

How to enter:

Fill in the speech bubbles (not more than 20 words in each) Then send your completed entry form to:

Speech Bubble Competition,
The Micro User, Europa House,
68 Chester Road, Hazel Grove,
Stockport SK7 5NY.

Name ____________________

Address ____________________

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Entries must reach us no later than November 30, 1984.

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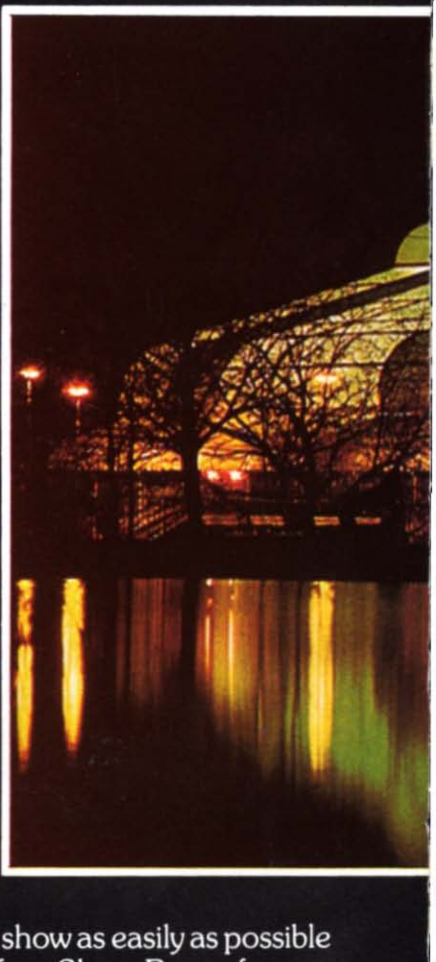
Everyone who is anyone in the exciting world of the BBC Micro and Electron will be at our greatest ever autumn show. And that includes all the big names you see advertising in the pages of our magazines.

Waiting for you will be more than 150 stands, packed with hardware, software and peripherals – some on show for the first time.

And everything will be for sale – much at really low, show prices!

Once again our team of writers will be there to give you free advice – an ideal opportunity to find out all the facts on the latest computing techniques. Don't miss this chance to meet in person the names you see in these pages every month!



Free buses! To get you to the show as easily as possible we are running free Show Buses from Alexandra Palace station, leaving every 10 minutes.

Free parking! There's plenty of free parking, too. All part of the service to make this an enjoyable and relaxing computer day out!

OPENING HOURS

10am-5pm	Thursday, 25 October
10am-5pm	Friday, 26 October
10am-5pm	Saturday, 27 October
10am-4pm	Sunday, 28 October

Christmas bonanza!

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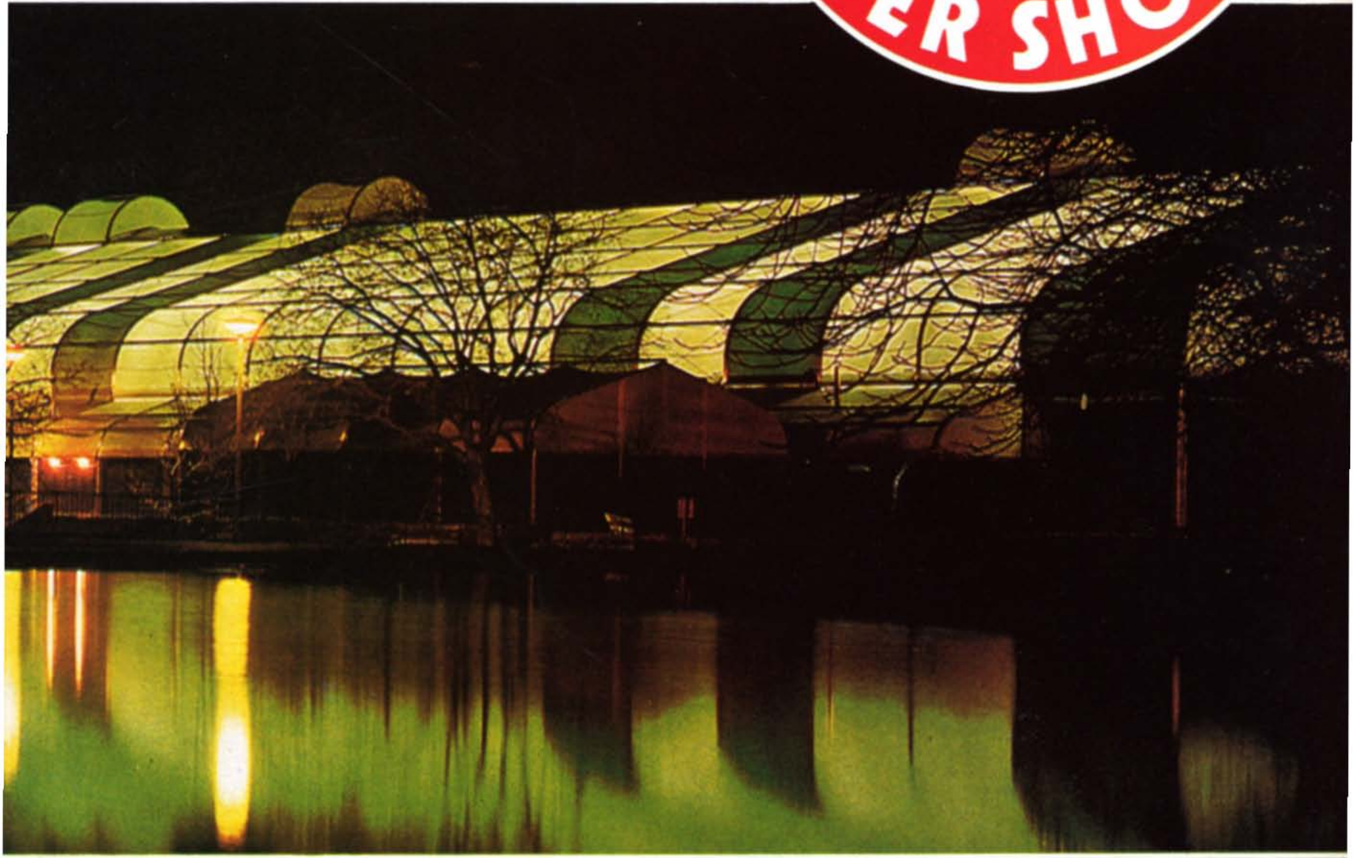
Thursday to Sunday
October 25 to 28



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Alexandra Palace
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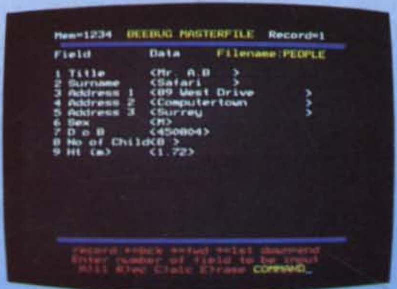
Number attending: ☐ 1 ☐ 2 ☐ 3 ☐ 4

SERIOUS SOFTWARE

FOR THE B.B.C. MICRO AND ELECTRON

From BEEBUGSOFT

MASTERFILE



```
Mem=1234  BEEBUG MASTERFILE  Record=1
Field         Data      Filename:PEOPLE

1 Title       <Mr. A.B   >
2 Surname     <Safari    >
3 Address 1   <89 West Drive         >
4 Address 2   <Computertown          >
5 Address 3   <Surrey                >
6 Sex         <M>
7 D o B       <450804>
8 No of Child<8 >
9 Ht (m)      <1.72>

[illegible]
Enter number of field to be input
[illegible] COMMAND_
```

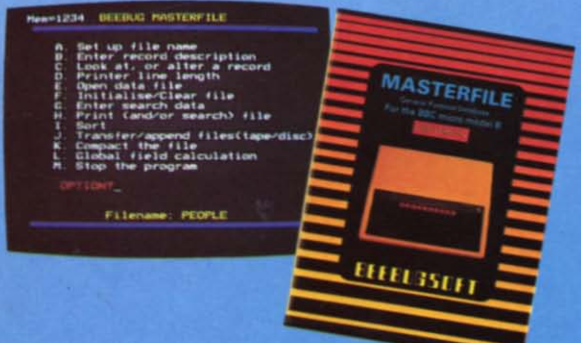
MASTERFILE is a general purpose data base, written especially for the BBC Micro. It is extremely useful, allowing vast amounts of information to be quickly stored.

Once set up, the information may be retrieved or sorted at any time, in a number of different ways, using any of the fields as keys.

Records may be instantly displayed or printed, using any printer suitable for the BBC Micro, also a label printing facility is included.

Separate versions of the program are available for cassette and disc based systems. The disc version uses random access files to maximise record storage.

One extra feature of the disc version is that it provides limited spreadsheet facilities.



```
Mem=1234  BEEBUG MASTERFILE

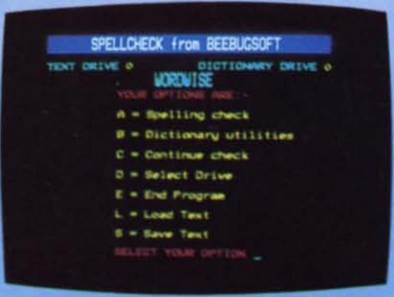
   A. Set up file name
   B. Enter record description
   C. Look at, or alter a record
   D. Printer line length
   E. Open data file
   F. Initialise/Clear file
   G. Enter search data
   H. Print (and/or search) file
   I. Sort
   J. Transfer/append files(tape/disc)
   K. Compact the file
   L. Global field calculation
   M. Stop the program

  OPTION?_

        Filename: PEOPLE
```

> "... Works well and offers an efficient data base... "
>
> PCN NOVEMBER 1984

SPELLCHECK



```
      SPELLCHECK from BEEBUGSOFT
TEXT DRIVE 0          DICTIONARY DRIVE 0
              WORDWISE
        YOUR OPTIONS ARE:-

        A = Spelling check
        B = Dictionary utilities
        C = Continue check
        D = Select Drive
        E = End Program
        L = Load Text
        S = Save Text

        SELECT YOUR OPTION _
```

SPELLCHECK is menu driven, and is the ideal companion for WORDWISE or VIEW. It provides an automatic spelling check for letters or documents.

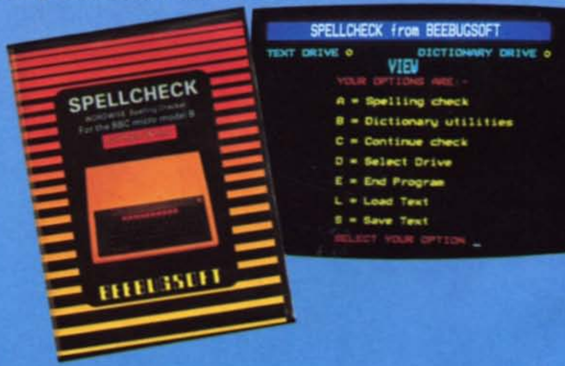
It is supplied with a dictionary disc already containing 6000 words, which may be increased to a maximum of about 17,000 words on a 100K disc.

Random access files ensure very fast word retrieval from the dictionary disc.

SPELLCHECK is menu driven, and is very simple to use, allowing unknown words to be added to the dictionary, ignored or re-spelt.

Incorrectly spelt words may be instantly respelt and a correct version of the document filed away, ready for printing or later use.

Dictionary discs for foreign languages may easily be created to help check letters sent abroad.



```
      SPELLCHECK from BEEBUGSOFT
TEXT DRIVE 0          DICTIONARY DRIVE 0
               VIEW
        YOUR OPTIONS ARE:-

        A = Spelling check
        B = Dictionary utilities
        C = Continue check
        D = Select Drive
        E = End Program
        L = Load Text
        S = Save Text

        SELECT YOUR OPTION _
```

> "... I found the program to be invaluable... fast and reliable... a worthwhile investment."
>
> PCN FEBRUARY 1984

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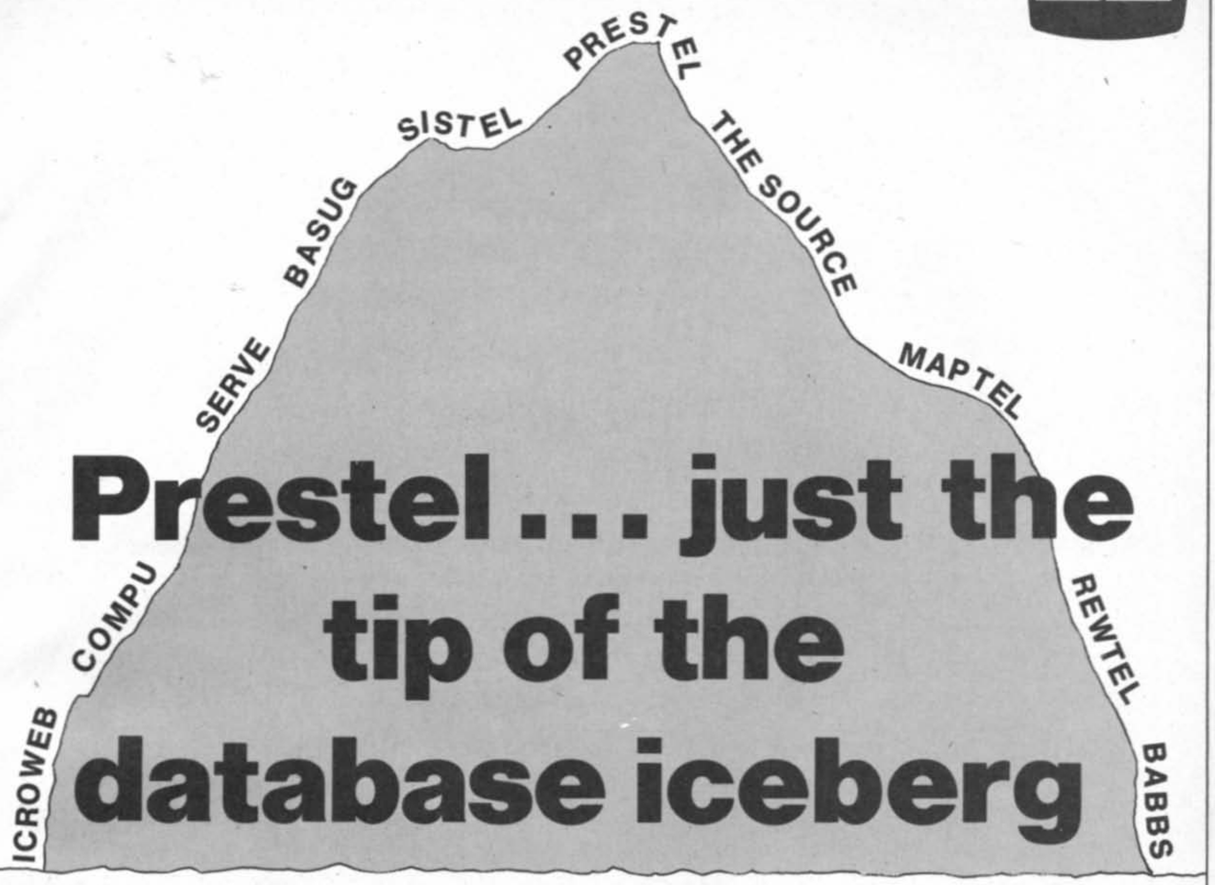

Prestel ... just the tip of the database iceberg

By STEVE GOLD

IN my last article I looked at the development and future of Prestel. Now we'll take a look at what else is available to computer users who have access to a phone and a modem.

In order to understand how databases work, it is helpful to understand a bit about how the data is transmitted down the phone lines, possibly from a distant computer to your own, or vice versa.

Basically each character is allocated a number, usually the Ascii code, which I'm sure most readers will be familiar with. This number is then transmitted as a series of pulses of different frequencies down the phone line, the resultant string of pulses then being reconstructed at the other end into a screen or teletype display.

The variable factors in such transmissions are the speed of the pulses and the actual frequencies used. The speed is measured in the number of characters per second – baud rate – and the frequencies used to conform to international guidelines.

In the UK most bulletin boards operate at the almost universal transmission frequencies of CCITT. In normal usage such nuances of the system need not bother the reader. The more crucial factor is the speed of transmission, which for bulletin boards is usually 300 baud send and receive – roughly 30 characters per second.

However, mainly due to the widespread use of Prestel, the rate of 1200 baud receive (at your terminal) and 75 baud transmit is gaining acceptance.

If the reader's modem and computer can receive Prestel then it's a safe bet that it is operating at 1200/75 baud. However all is not lost, for many modems are capable of dual or more frequencies, like the Nightingale modem being offered by *The Micro User*.

A bulletin board is simply what it says – a board where people can dial in and read or write notes to each other. It acts as a central point where networkers can "chat" to each other via their keyboards.

In the past few years there has been a profusion of bulletin boards in the UK including, of course, the introduction of Microweb. At the end of this article there is a list of boards available to UK modem owners. Please note, however, that some boards operate only restricted hours, so read the notes carefully.

If one looks at the USA, where, for various reasons, the idea of bulletin boards started, you can see the evolution of networking several years ahead of the UK.

Most boards within the UK involve people in a long distance call costing between £3 and £4 an hour. Call charges in the States, because of the vast distances involved, are proportionally greater.

In the early 1970s, certain US networkers were forced to look at the alternatives to that provided by Ma Bell, the US equivalent of British Telecom.

There exists in this country, as well as most others, including the US, an overlay network which serves exclusively to shift data between computers. Such systems are called packet switch networks, because they packet data up and whiz it between exchanges, or nodes as they are called.

Since the data is packeted, it can share the same lines as other data packets, with resultant savings in line costs. These reductions result in substantial economies to end users when compared to the public telephone networks.

Most large users of packet switch

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- ☐ Interface Details

From Page 151

networks are hooked directly in via datalines, but smaller users can dial in to nodes – usually at local call rates – and transmit via their modems to these distant mainframes.

In this way a user in New York can make a local phone call to his local packet switch node and contact a computer in California at a cost of only pence per minute.

It doesn't stop there. A call via Packet Switch Stream – the UK's packet switch network – costs as little as 13p a minute to link with a mainframe in the States. This compares favourably with a charge of about £1 a minute direct dialled transatlantic phone call.

Back to the States. In the early 1970s, certain large companies realised the potential of PSS. If they reduced the network costs to end users they could add on a service charge and provide a sophisticated service in addition to a basic bulletin board.

Such a service would be many times the size of a normal bulletin board and contain megabytes of information on most imaginable (and unimaginable) networking and associated subjects.

> **'A user in New York can contact California at a cost of only pence per minute'**

So it was that the concepts behind The Source and Compuserve were born.

The Source provides, in essence, an American parallel of the UK's Prestel database, but on a much larger scale, both in services provided and the numbers catered for. Since it is much older than its UK cousin network, its services are some three to four years ahead of the UK's in evolutionary terms.

UK BULLETIN BOARDS

Name	Tel. No.	Baud Rate	Hours of operation
Basug	0268 778953	300+ 1200/75	24 hours
BABBS	0742 667983	300	24 hours
Birmingham	0827 288810	300	24 hours
Blandford	0258 54494	300	24 hours
CBBS NE	07073 28723	300	6.30-10.30pm
Computer Answers	01-631 3076	300+ 1200/75	24 hours
Distel	01-679 1888	300	24 hours
Hull Forum 80	0482 859169	300	5.30-11.30pm (M-F). Noon-11.30pm (Sa and Su)
Liverpool	051-428 8984	300	24 hours
London CBBS	01-399 2136	300	5-10pm (Sun)
London TBBS	01-348 9400	300	10pm-1am (M-F). 2pm-1am (Sa and Su)
Manchester	061-427 3711	300	10.30-12 midnight (Sun-Thurs). 10.30-2am (F and Sa)
Maptel	0702 552941	300	24 hours
Microweb	061-456 4157	300	24 hours
Nottingham	0602 289783	1200/75	24 hours
Rewtel	0227 232628	300	24 hours
Southern BBS	0243 511 077	300	24 hours
Stoke Itec	0728 265078	300	24 hours
Surrey BBS	04862 25174	300	24 hours
South West	0626 890014	300+ 1200/75	24 hours
TBBS Southern	0703 437200	300	Evenings (ring back)
Wembley Forum 80	01-902 2546	300	Evenings and weekends
West Midlands	0384 635336	300	5.30-8.30am

Several of these have up-to-date listings of currently active boards.

Notable facilities include interactive noticeboards, electronic mail (with links to other services), teleconferencing, telemessaging and participative file areas for all users.

Compuserve is younger than The Source and this is reflected in its service, which is comparatively more user friendly and more fun to use. I suppose one could say that Compuserve's general policy is much looser than that of The Source, which is owned by the Readers Digest.

Its services, not surprisingly, are the mirror image of those on The Source, with one of two enhancements. For example the interactivity between members is enhanced by the use of the Citizens Band simulator which, as the name implies, is a realtime interactive CB allowing chatting via the keyboards of the various computers online at any given time.

Both The Source and Compuserve can be accessed via direct dial as well as PSS from this country, and while being more expensive than Prestel – which is, after all, a cousin of these US based systems – are great fun to use as well as being very informative.

The average reader of this article will, by now, have deduced that there is a whole lot more to networking than Prestel alone. Indeed, Prestel is but the tip of the iceberg as databases go. There are many other services and databases avilable via PSS to end users, but, sadly due to their business orientation, their charges are correspondingly higher.

The author produces a monthly cassette-based magazine which takes up the networking story where this article leaves off. It costs £2, which includes a C90, and is currently available for BBC and Sinclair Spectrum owners.*

Other points of contact:

Compuserve Information Services,
5000 Arlington Centre Blvd, Columbus,
Ohio 43220.
Tel: 01 01 614 457 8650.
Source Teleputing Facility, 1616
Anderson Road, McLean, Virginia,
22102.
Tel: 01 01 703 821 6666 734 7500.
Packet Switch Stream (National Networks), London.
Tel: 01-920 0661 or Freefone 2170.

**Further details from Steve Gold, 9 Watt Lane, Sheffield 10 or Prestel Mailbox 019995800.*

All aboard for the data package tour

By MIKE COOK

WHENEVER information is moved from one place to another over channels that can carry more than just one voice, it travels in packets. Just like the low cost package tours that pack many holiday makers onto one aeroplane for economy, data is bundled into many packages and sent along one channel.

A voice signal is packaged in the same way for long distance and overseas phone calls and at the other end it is unwrapped and given its own channel.

All this is done to utilise the capacity of a channel economically. This capacity is known as its bandwidth and it is a measure of how many signal transitions can be transmitted in a second. For a 1200 baud data line this is about 2.4KHz.

As a rule of thumb the bandwidth of a channel must be at least twice the highest frequency you want to transmit. This is because the transition of a signal from one level to another, if done quickly – as it is if digital signals are being used – contains a very large number of harmonics.

If the bandwidth of the channel is insufficient to allow some of these through you will have great difficulty in detecting the transition at the other end.

So the greater the bandwidth of a channel the faster you can send transitions down it, and the more information can be passed.

Now some transmission media such as microwave links, fibre optics and satellites have very wide bandwidth channels. It is very rare that one device will want to communicate with another at such a speed that it needs to use all the capacity of the channel.

So unless something is done a lot of this capacity will go to waste. The answer is to share the channel with others.

However this must be done in such a way as to look as if you had a channel of your own. This can be done in a way known as multiplexing.

There are two types of multiplexing – frequency division and time division. Frequency division multiplexing is mainly used for audio telephone lines. It involves modulating the audio signal at some higher frequency.

Modulation is the process of putting information onto another waveform. In mathematical terms the information is known as the modulating waveform and is multiplied by the carrier waveform.

This changes the size or amplitude of the carrier waveform at the same rate as the modulating waveform. It is therefore known as amplitude modulation or AM for short and is the way most long and medium wave radio transmissions take place.

In order for it to work properly the carrier wave has to be many times higher in frequency than the modulating wave.

Each telephone call is modulated at a different frequency and the whole lot is sent down the long distance telephone lines. At the other end a demultiplexer filters out each channel and transfers it to its own local line. This is just like having a number of different radio sets all tuned to a separate station.

The cause of some crossed lines is the mistuning of these "radio sets". Nevertheless it allows many calls to be made simultaneously on one channel.

In practice it is a little more complex, with several telephone calls being multiplexed together into a group and several groups are further modulated into a super group.

One of the reasons why British Telecom wants to approve even acoustic-coupled modems is that if a signal which is too loud is sent down the line it would interfere with adjacent channels in these groups, due to overmodulation of the signals.

Most digital signals such as those from a computer or from digitised telephone conversations use time division multiplexing. Here you have exclusive use of the channel for a very short time but you can pass so much data over in that short time that you do not notice the difference.

At the multiplexing end a buffer gathers your data until it is your time to use the channel. When that time comes it is squirted at high speed down the channel and a buffer at the other end catches it, stores it and slowly releases it to the receiving equipment.

Providing you have a "turn" often enough you do not notice you are sharing a line. This technique is used when you want a private line between two devices.

Very often in computing we wish to communicate with more than one device and so we can use a variant on time division multiplexing known as packet switching.

This is how computer networks work. All the communicating devices are connected together by a common channel. This is usually some form of co-axial cable, but could be anything – even a radio link. The points that con-

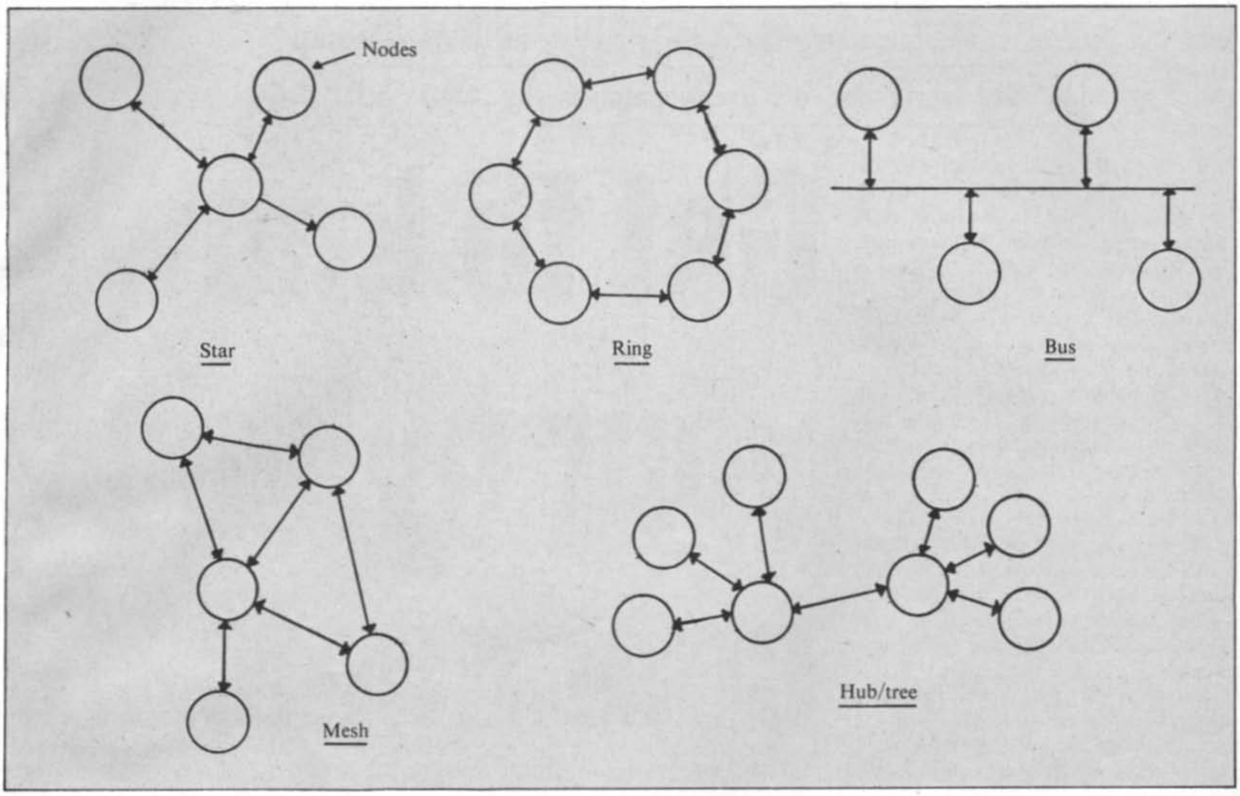

Figure I: Network topologies

nect to the line are known as nodes and there are several ways these can be connected (see Figure I).

As this channel has a high capacity all the nodes work at the maximum baud rate.

When one node wants to communicate with another it sends its message in a series of bursts or packages. The packages contain not only the message but also information about who sent it and who it is for. Thus it is possible to send a message to more than one node simultaneously.

A message, by the way, is usually some data or program you want to pass, although it could be a request for information such as: "What's the weather like where you are?"

This is all well and good, but what happens when two nodes want to use the channel at the same time? If this happens it is known, appropriately, as a collision and is where a number of different schemes can come into play making one computer network incompatible with another.

In one scheme called collision avoidance, the node waits until the line is free and then waits a random length of time. If the line is still free it then sends a message to the other node saying: "Are you free?"

If it receives an answer within a certain time it knows that nobody else is using the line and carries on sending packages to the node. It then has full access to the line until it finishes.

The only time a collision can occur is during the initial call, and if an answer is not received after a set time it knows a collision must have occurred and so backs off and tries again later.

As there is a random delay the odds are that one device will get in before any other and establish a link. This is the basis behind the networking system used on Lisa and Macintosh. They call it Applebus, but the same type of scheme is used with many networks.

The network most readers will have heard about is Econet, as it is the one that can be used with the BBC Micro. This uses a different scheme – collision detection. With this system a clock signal is distributed to all the nodes which divides the time up into packets so each node knows when each packet time starts.

When a node wants to send it waits until it sees a free package and then sends its message in the next one.

But as well as transmitting it also listens to its own transmission. If it does not hear exactly what it has transmitted it backs off and waits a random time before trying again.

Thus with several nodes trying to access simultaneously one will eventually get in first.

With all these schemes a point is reached when traffic along the channels is so great that the system breaks down or runs very slowly. It is then that the large network is split into smaller ones that are networked together. Then a packet finds its destination by being switched from one network to another.

On the Econet system this linking of networks is known as a bridge, and packets can be switched by network controllers and sent over the appropriate bridge. Exactly what happens depends on the type of interconnecting network you have.

If you think this is all too remote to ever concern you there are groups of radio amateurs who are planning a packet switched radio link for their computers. And one of the nodes proposed is an amateur radio communications satellite!

There are exciting moves afoot in this area of communications so it's time to start thinking about what you are going to say!

Development of communications software requires an understanding of machine code. But worry not, it's pretty painless the ANDY HOOD way . . .

Get to know your nybbles-communicate

IN the last couple of articles on communicating with the BBC Micro* we have touched on machine code programming, interrupt driven routines, and streaming and buffering of data – all without the aid of a safety net!

Hopefully though, in the last few months some of the mystery behind the jargon has been removed.

In computing more than anything else the very quantity of jargon can prove quite a barrier to anyone wanting to probe deeper into the workings of the machine.

I know that when I first started experimenting with machine code the whole subject appeared very daunting and it seemed highly unlikely that my efforts would produce anything other than a locked out keyboard and a blank screen.

However, a basic understanding of machine code programming and the way in which the micro stores its data yields rich rewards in terms of the additional speed and power obtained by talking to the BBC in its natural language – even if the process of learning can be a bit heavy on the Ctrl + Break keys!

To progress further with the development of our communications software this basic understanding becomes necessary.

While it would be impossible to fully cover machine code programming in this short article, I would like to describe some of the fundamental building blocks so that you can have as much fun experimenting and learning as I have had.

The first and most obvious question is why is machine code so much faster and powerful than the Basic interpreter supplied with your micro? The answer really is in that word interpreter.

Imagine being in a non-English speaking country and having to quickly convey a message to someone. You have two ways of doing it.

One method is, of course, to speak to the person in their native language. But this requires you to have already learned that language.

The second method is to find yourself an interpreter who will listen to what you say in English, make sure that he understands it, and then convert it to its nearest equivalent in the native language.

You can readily see which will be the quicker and give more freedom of expression.

This is a pretty fair analogy to the relationship between machine code and interpreted languages such as Basic.

At this point you may be wondering where that thing called an assembler fits in between Basic and machine code. To understand this we first need to look at the way machine code, and indeed any data, is stored in the micro.

The BBC Micro is an electrical piece of equipment and as such really only has two conditions: it is either on or it is off. Likewise all of the circuits within it have the same two basic conditions.

To represent these two states we use a numbering system known as binary, where a 0 indicates the off condition and a 1 the on condition.

Great stuff so far. But being limited to counting up to 1 could be a bit of a handicap and this is where the code comes in.

In order to represent a number greater than one we have to group together a sequence of *ons* and *offs*, each of which forms a bit of the code.

The 6502 processor, the thing that does the de-coding in the BBC, looks at eight of these bits at a time. We arbitrarily call these 8 bit chunks a 'byte'.

So if there are 8 bits in this byte and each bit has two states – on or off – we can represent in one byte numbers up to 2 8—1, that is:

2*2*2*2*2*2*2*2—1

which equals the very familiar total of 255.

Numbering the bits from 0 to 7, each bit represents the number of units as shown below:

	one byte								
bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
value if on	**128**	**64**	**32**	**16**	**8**	**4**	**2**	**1**	**total 255**
value if off	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

So if we wished to pass the value of 65 to the processor we would need to send a byte with bits 0 and 6 on to give 1+64=65.

Having got bits and bytes sorted out we can now see a reason for the apparently unnecessary additional complication of hexadecimal notation, which is defined by preceding the number with &.

As writing 8 bits down every time we wish to think of a number can be a bit –

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* *The Micro User, July (Page 127) and September (Page 116).*

(no pun intended!) – of a strain, some clever devil thought of splitting the 8 bits into two 4 bit chunks known as nybbles. I often wonder who on earth thinks of these names!

Anyway, if you take a sequence of 4 bits, the maximum number they can represent is 2∧4—1 which equals 15.

Looking at the bit pattern above we see that if all of these bits were set – that is, the number equalled 255 – writing it down in two 4 bit chunks in normal decimal would be represented by two 15s, that is, 1515.

This, of course, is totally confusing. Being very logical computer programmers, we would use a numbering system where one character could represent 0 to 15 units.

As single digits in decimal only go up to nine we have to represent the numbers 10 to 15 with the letters A to F, where A=10, B=11 and so on up to F=15.

better

You can now see that all bits set (255 decimal) can be represented by &FF instead of 1515. The 4 bits in the high nybble – the highest numbered section of the byte – being the first F and the bits in the low nybble being the second F and the decimal equivalent being (15*16)+15 or 255.

Phew! Told you it was easy, didn't I?

This numbering system is called hexadecimal after the Greek for 16, as a total of 16 different numbers – 0 to 15 – can be represented by each hex digit.

"Why not just use decimal?" I hear you ask.

Well, decimal is fine for most operations and there is certainly no reason not to use it. However, in our field of communications, where data is sent in certain bit formats, an understanding of binary and the way in which hex can easily represent binary patterns is very useful – as you will see later.

Just to recap. A byte is made up of 8 bits and can represent any number between 0 and 255.

The hexadecimal (base 16) numbering system provides an easy way of deducing which bits are set in a byte by breaking up the 8 bit pattern into two 4 bit patterns.

For example: What is the bit pattern for a byte containing the value &4F? If we take the high nybble first &4 and remembering:

bit	3	2	1	0
value if set	8	4	2	1

&4 is represented by 0100 and the low nybble &F (15 dec) is 1111.

Writing the two together, &4F=01001111 or, referring to our full 8 bit code, 64+8+4+2+1 which equals 79 decimal.

Of course using a base 16 numbering system where each position to the left represents a multiplication by 16 we could have arrived at the decimal equivalent of &4F by 4*16+15=79 just as 23 in decimal base 10 means 2*10+3.

If you find all this a bit confusing at first don't worry – it does take quite a bit of practice to think in a different number base.

Trying out a few conversions from hex to 8 bit binary code and decimal will soon get you familiar with it though. I strongly recommend that you re-read the last section and try a few out.

Right, back to the assembler.

The 6502 processor expects to receive all its instructions in this 8 bit code and in order to help us program it without having to write down a string of fairly unintelligible numbers the assembler converts more meaningful mnemonics, or labels, directly into this machine code.

This has the added advantage that by writing the code with an assembler other programmers can read and hopefully understand your programs.

So, now we understand the system of bits and bytes, how do we apply our knowledge?

As you would expect the BBC, in common with most other micros, has a set of commands in both Basic and assembler to alter directly the state of any or all bits within a byte.

These are known as logical or bitwise operators. The three that are common to both Basic and assembler are AND, OR and EOR.

AND is primarily used to zero or reset selective bits and works, like the other two instructions, by the use of mask byte.

Any reset bits – zeros – in the mask byte will cause the corresponding bits in the target byte to become zero. It is probably easier to understand if we take an example.

Say we have a Basic program where the user is asked to enter a letter corresponding to options on a menu, such as:

A – Alter Record.
D – Delete Record.

If we have a normal routine which checks for the Ascii equivalents of A and D it might look something like this:

```
100 character = GET
110 IF ASC(character) = 65 THEN
PROCalter : REM ASC("A") = 65
120 IF ASC(character) = 68 THEN
PROCdelete : REM ASC("D") = 68
```

However if the user enters a lower case *a* or *d* our routine will not recognise it and this obviously does not make the program terribly user friendly.

A close look at the list of Ascii codes – see Page 486 of the User Guide – shows us that the upper case alphabet starts at code 65 and the corresponding lower case alphabet is shifted up by 32 and starts at code 97.

Looking again at our 8 bit code we can see that the bit five indicates the value 32 and so this bit is always set – that is, has value 1 – in the lower case alphabet and clear – value 0 – in the upper case codes.

A simple way round our input problem would then be to reset the fifth bit of any lower case character input to convert it to upper case.

To do this we must provide a mask byte with all bits set except for bit 5. This is where hex representation can make life a little easier for us.

As in the earlier example we take the high and low 4 bit nybbles separately.

The high nybble will have all bits set except number 5 and so will look like this:

bit	7	6	5	4
value	1	1	0	1

which, using our 4 bit system, gives 13 decimal or &D.

The low nybble will have all bits set and so will give 15 decimal or &F.

The mask byte we want is then &DF or 11011111.

If we then add a line 105 into our routine:

```
105 character = character AND &DF
```

we will automatically convert all lower case input into upper case before carrying out our checks.

The rule for AND is then:

☐ *To clear bits to 0, place 0s in the*

→

From Page 157

mask to ensure that corresponding bits are at 0.

☐ *Place 1s in the mask to leave existing bits unchanged.*

The next logical operator is OR and, as a complement to AND, its rule is:

☐ *To set bits to 1, place 1s in the mask to ensure corresponding bits are at 1.*

☐ *Place 0s in the mask to leave existing bits unchanged.*

So to convert from upper case to lower case we could use a mask with only bit 5 set or:

```
0010   0000
 ^       ^
 2       0   =&20
```

So our program line would read:

```
105 character = character OR &20
```

The final operator is EOR whose function is to change selected bits and its rule is:

☐ *To change bits place 1s in the mask to ensure that the corresponding bits are changed.*

☐ *Place 0s in the mask to leave bits undisturbed.*

Well, that's about it on bytes, nybbles and bit manipulation and with hardly a pause for breath we'll move on to registers.

The 6502 has three registers known as the A, X and Y registers. Each can be likened to a memory location that can hold a single 8 bit byte.

The A or accumulator register is the main workhorse of the system and is the only register with arithmetic capabilities, these being limited to straight addition and subtraction.

The X and Y registers are similar but have no arithmetic capability other than by being incremented or decremented by 1.

All three registers can be loaded with data or the contents of a memory location and can store data in memory or transfer it between each other.

The other main device in the 6502 is something called the stack, which is used for temporarily holding a copy of data pushed onto it from the A register.

The word stack accurately describes the way in which it operates, as to get at the first byte in a series of, say, five transferred to it you must first take off the last four. This system is known as LIFO for Last In First Out.

All of the assembler instructions affecting these registers are, as I have mentioned before, known as mnemonics.

This means that the name of each instruction gives an indication of its function.

For instance:

STA – ***ST****ore* ***A****ccumulator*
STX – ***ST****ore* ***X*** *register*
LDA – ***L****oa****D*** ***A****ccumulator*
JMP – ***J****u****MP*** *to memory location*
JSR – ***J****ump to* ***S****ub****R****outine*
RTS – ***R****e****T****urn from* ***S****ubroutine*
PHA – ***P****us****H*** ***A****ccumulator (onto the stack)*

and so on.

You can see from these examples that the very nature of mnemonics helps us to decipher just what type of operation the assembler is asking the processor to carry out.

Coupled with an understanding of the way in which data that the operation refers to is stored, programs like the Micro-Term listing given in the September 1984 issue of *The Micro User* can be more easily read and understood.

Finally, let's apply some of the concepts we've looked at this month to extend the capabilities of Micro-Term.

During previous articles I have mentioned how data is sent via the RS423 is transmitted in a particular bit format.

All of these formats are slight variations on the internal 8 bit code that we have been looking at. In order for two systems to communicate properly they must, of course, be exactly matched.

All data sent via the RS423 is preceded by one start bit to synchronise the transmitter and receiver. The actual character code is then sent in either 7 bits – if no code outside the normal Ascii range of 0 to 127 is required – or a full 8 bits.

Following these character bits is an optional parity bit which, if selected, is an additional bit sent to either:

☐ If parity is even – make the total number of set bits an even number.

or

☐ If parity is odd – make the total number of set bits an odd number.

Finally an optional stop bit or bits may be sent to signal the end of that particular character code.

On the BBC Micro the current setting of these options is held in the RS423 control register located in one 8 bit byte at memory address &FE08.

Bits 2, 3 and 4 of this memory location are dedicated to the control of these options giving a possible 2^3 or 8 different settings and these are listed below:

bit4	bit3	bit2	bits in word	parity	stop bits
0	0	0	7	even	2
0	0	1	7	odd	2
0	1	0	7	even	1
0	1	1	7	odd	1
1	0	0	8	none	2
1	0	1	8	none	1
1	1	0	8	even	1
1	1	1	8	odd	1

Direct poking of this memory address is definitely not advised as the other bits in the 8 bit word control important functions and so must be left unaltered when changing the word format.

The MOS command that accesses this location is OSBYTE 156 and in common with all other MOS calls above &A6 (166) it works like this:

new contents = (old contents AND Y) EOR X.

It is important then to establish the correct mask for the Y register that will zero bits 2 and 4 and leave all others unchanged.

So we're back to our 4 bit nybbles!

The upper nybble is then 1110 =&E and the lower nybble is then 0011 =&3 giving us a mask byte of &E3 or decimal 227.

Remembering that EOR changes selected bits we can now load the X register with one of the bit patterns in the table above.

To change to a 7 bit word, odd parity, 1 stop bit setting we need then to set bit 2 in the X register so we would load X with 0000 0100 which is, of course, &04.

Our program to execute the change would then be *FX 156,227,4 in Basic.

In assembler this would be:

```
OSBYTE=&FFF4
LDA £&9C   : REM = 156 decimal
LDX £&04   : REM = 4       "
LDY £&E3   : REM = 227     "
JSR OSBYTE : REM do the FX call
```

With one additional routine we can configure the RS423 to any of the standard settings used by the many different bulletin board and mainframe systems.

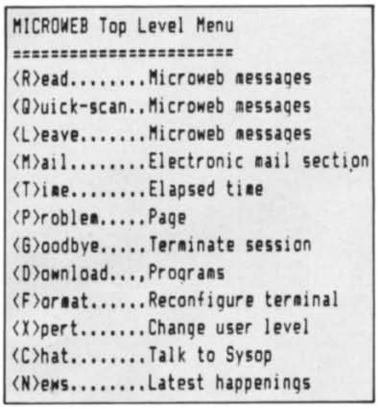
This month we have covered an enormous amount of ground. All those bytes, bits and assembler mnemonics were not so difficult, were they?

Next time we'll see how to put them to good use . . .

A user's guide to

IN September's *Micro User* we briefly led you through the procedures for logging on to Microweb, our own bulletin board. We finished with a quick look at the top level menu and the options for leaving messages for other people, whether for public or private reading.

This brings us to the other reason for using a bulletin board – reading messages, either your own personal mail or general messages.

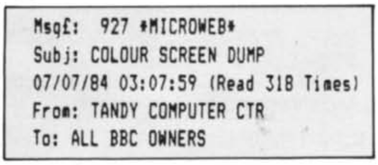


```
MICROWEB Top Level Menu
=======================
<R>ead........Microweb messages
<Q>uick-scan..Microweb messages
<L>eave.......Microweb messages
<M>ail........Electronic mail section
<T>ime........Elapsed time
<P>roblem.....Page
<G>oodbye.....Terminate session
<D>ownload...,Programs
<F>ormat......Reconfigure terminal
<X>pert.......Change user level
<C>hat........Talk to Sysop
<N>ews........Latest happenings
```

There are two selections on the top level menu that permit you to read messages – **R** and **Q.**

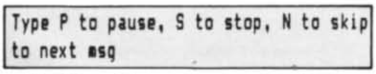
The **Q**uick-scan option allows you to skip through all the public message boards marking any message that you want to look at in detail later. At this level you're presented with only the headers and subject headings of each message.

A typical scanned message will appear like this:



```
Msg£:  927 *MICROWEB*
Subj: COLOUR SCREEN DUMP
07/07/84 03:07:59 (Read 318 Times)
From: TANDY COMPUTER CTR
To: ALL BBC OWNERS
```

After selecting **Q** a description of the control options **P**, **S** and **N** appears. These can be used at any time while reading messages, as shown in the following prompt:

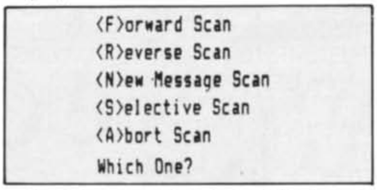


```
Type P to pause, S to stop, N to skip
to next msg
```

P will enable you to pause as the scan progresses. **S** will stop it immediately and return you to the current menu while **N** moves you onto the next message.

As I've already implied, these prompts are not peculiar to the Quick-scan menu but are standard throughout Microweb for all message reading menus.

The **Q**uick-scan menu is then displayed:

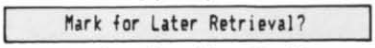


```
<F>orward Scan
<R>everse Scan
<N>ew Message Scan
<S>elective Scan
<A>bort Scan
Which One?
```

In this menu **F** and **R** will take you forwards or backwards through the messages. That is **F** displays messages in numerical order whereas **R** displays them in reverse order. The latter may seem odd, but sometimes you may just want to scan through the latest additions to the board.

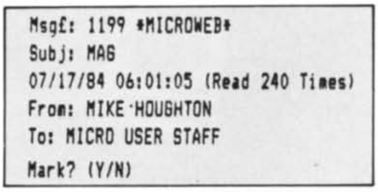
N will show only messages new to you since your last log-on. **S** allows you to select a scan either from a number to a number or by subject material. Finally **A** aborts the scan and returns you to the current menu.

Any selection from the menu results in the following prompt for "marking":



```
Mark for Later Retrieval?
```

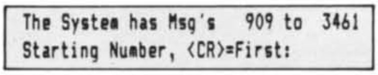
Answering this with a **Y** will ensure that after each message is displayed you are given the options of "tagging" it to inspect in detail later. It looks like this:



```
Msg£: 1199 *MICROWEB*
Subj: MAG
07/17/84 06:01:05 (Read 240 Times)
From: MIKE HOUGHTON
To: MICRO USER STAFF
Mark? (Y/N)
```

This facility allows you to recall and read any complete message once you have returned to the current menu.

Having made your decision about the marking prompt, you will then be presented with the following information (with of course varying numbers):

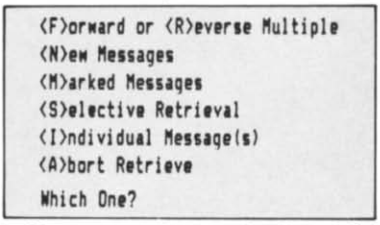


```
The System has Msg's   909 to  3461
Starting Number, <CR>=First:
```

You can now select which message you wish your scan to start at.

If you enter Return and the first message you are shown is several numbers later, don't assume there is something amiss. It just means that the missing messages are either private ones, on another message board or awaiting purging by the Sysop (System Operator), having been marked for deletion.

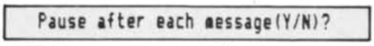
When your scan is complete you will return once again to the current level menu where you can select the option to **R**ead Microweb messages. In fact you have to do this to read the messages you have marked. You will again be presented with a second menu, quite similar to the **Q**uick-scan one, but with two additional options:



```
<F>orward or <R>everse Multiple
<N>ew Messages
<M>arked Messages
<S>elective Retrieval
<I>ndividual Message(s)
<A>bort Retrieve
Which One?
```

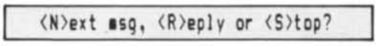
Here you can read all public messages from first to last or vice-versa, read only messages new to you since your last log-on, or select messages between certain numbers or by subject material.

The additional **M**arked messages allows you to read only messages which you have previously marked for retrieval during your quick scan, and the **I**ndividual messages permits you to select any particular message by number. After keying in your selection the final prompt before you read the messages is:



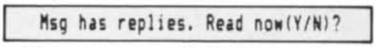
```
Pause after each message(Y/N)?
```

If you answer **Y** to this each message will pause at its conclusion with:



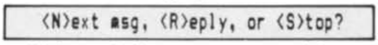
```
<N>ext msg, <R>eply or <S>top?
```

One final point worthy of note. Anybody can reply to a public message. Any message with such a reply will be followed by:



```
Msg has replies. Read now(Y/N)?
```

If your answer is **Y** Microweb will jump to the replies. Once you have finished reading them you are presented with the following options:



```
<N>ext msg, <R>eply, or <S>top?
```

If the reply is to a message originated by yourself, you are provided with an additional option of **D**eleting the reply once you have read it.

Well that's all for this session. I hope it's encouraged you to log-on to Microweb soon.

When you do you will join a user log in excess of 1,600 names already, originating from places as far afield as Switzerland, Norway, Germany, France and even Australia.

Alan McLachlan

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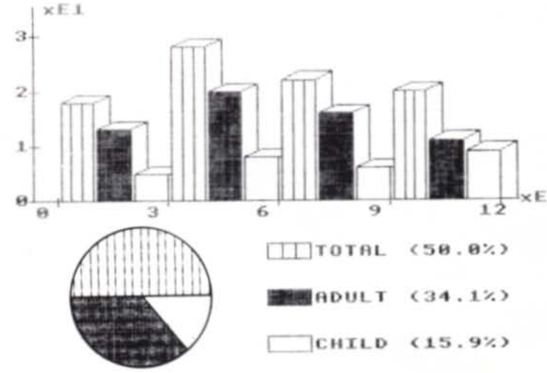
- DEFAULT VALUES for WEEKS/MONTHS
- LINE GRAPHS
- BAR CHARTS/HISTOGRAMS
- PIE CHARTS
- VERTICAL BAR CHART
- COMBINED BAR/PIE CHART
- ENTER EQUATIONS IN X, Y or PARAMETRICS X, Y, Θ
- ANGLES IN RADIANS or DEGREES
- PLOT XΘ, YΘ, YX, ZΘ, XZ, YZ etc.



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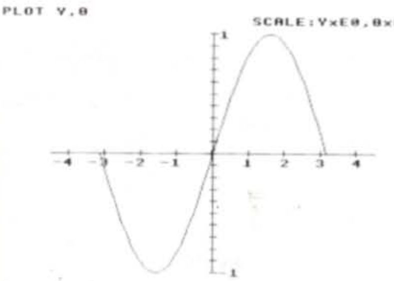

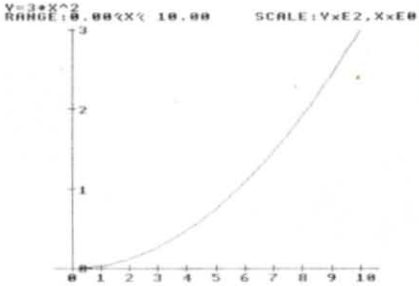

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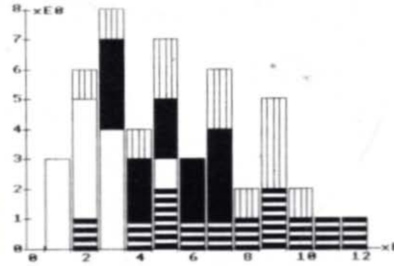

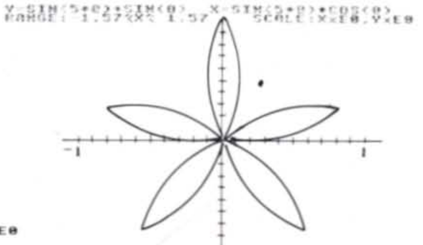

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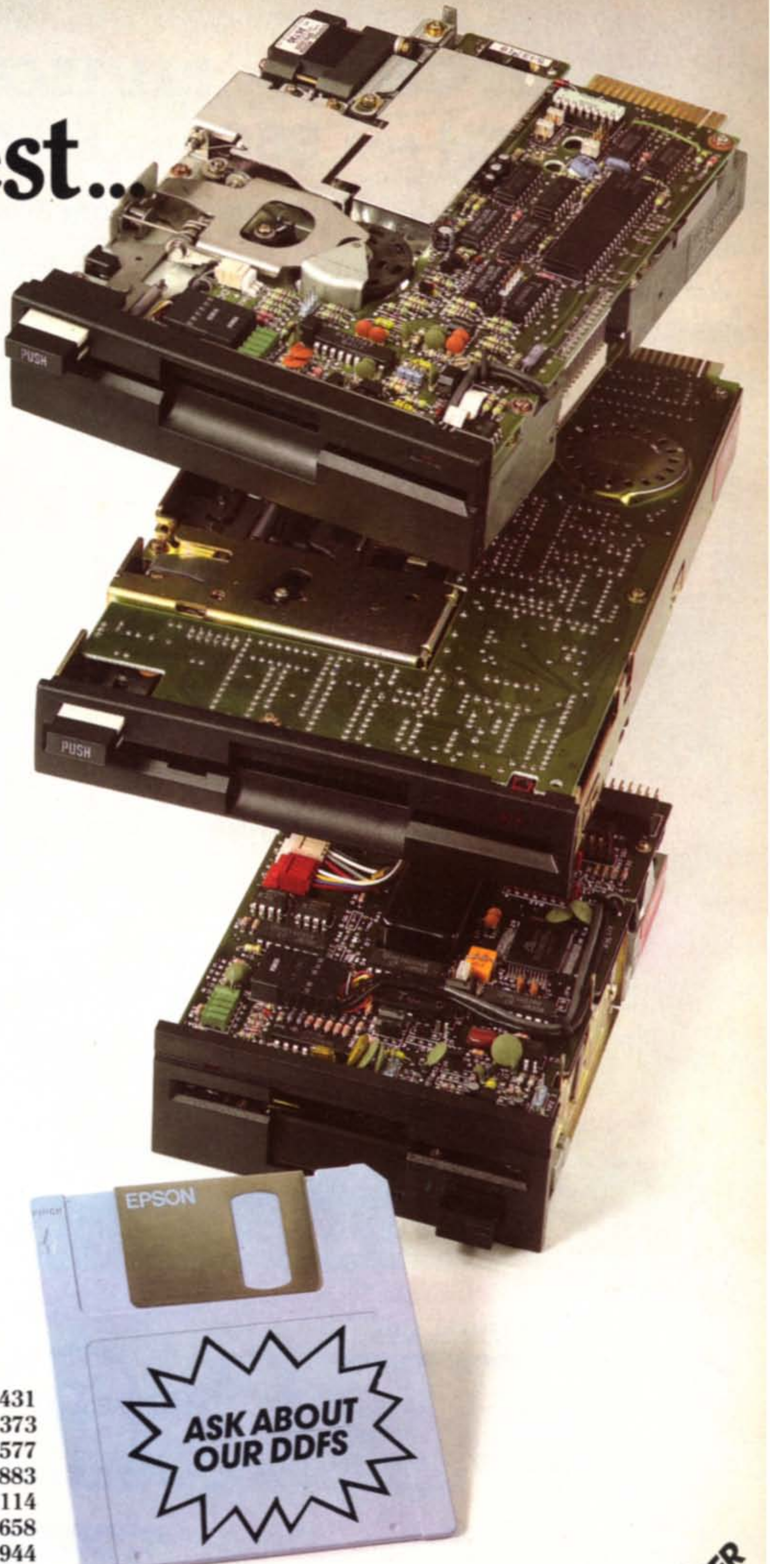

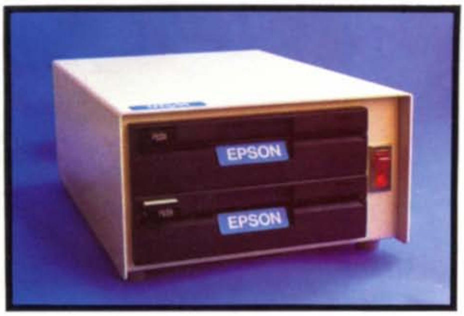

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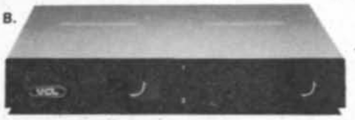

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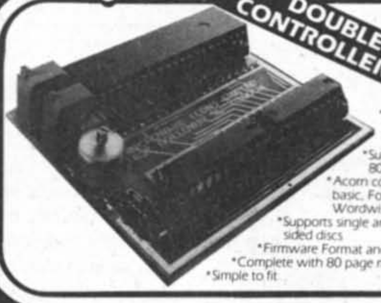

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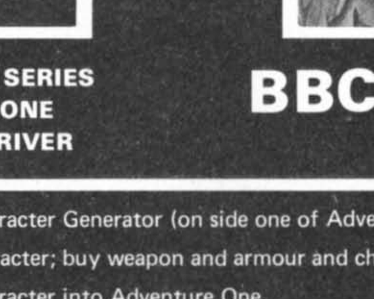

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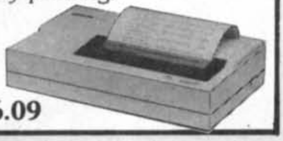

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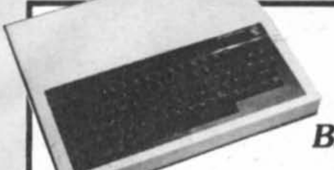

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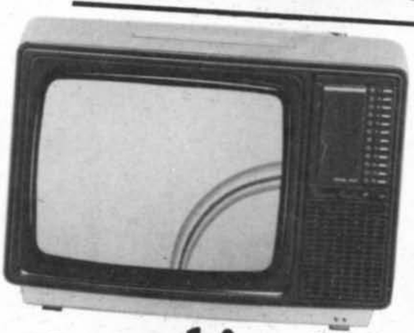

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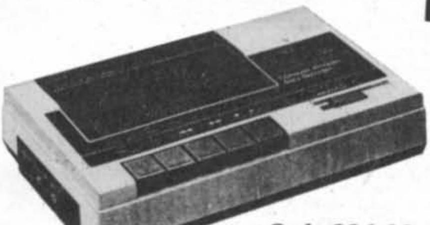

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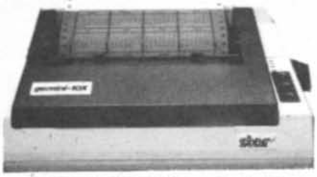

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From Page 128

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  200 COLOUR8:PRINTTAB(6,6)"2":COLOUR
7:PRINTTAB(9,6)"or":COLOUR15:PRINTTAB
(13,6)"3"
  210 COLOUR3:PRINTTAB(1,3)"How many
clouds ?"
  220 GCOL0,132
  230 CLG
  240 VDU5
  250 c%=GET-48
  260 IFc%=2THEN GOTO310 ELSE GOTO270
  270 PROCcloud(15,1000)
  280 PROCcloud(50,975)
  290 PROCcloud(100,1000)
  300 PROCcloud(125,975)
  310 PROCcloud(600,1000)
  320 PROCcloud(625,950)
  330 PROCcloud(550,975)
  340 PROCcloud(650,975)
  350 PROCcloud(1150,900)
  360 PROCcloud(550,975)
  370 PROCcloud(650,975)
  380 PROCcloud(1150,900)
  390 PROCpoint(9,1,15,1)
  400 COLOUR3:PRINTTAB(0,3)"  What co
lour sea ?"
  410 a%=GET
  420 GCOL0,a%+48
  430 VDU5
  440 PROCdraw
  450 PROCwave(7,1,1300,685,300)
  460 *FX9,100
  470 *FX10,100
  480 PROCwave(4,1,1050,685,150)
  490 PROCwave(11,1050,250,685,75)
  500 REM*LIGHTHOUSE
  510 GCOL0,7
  520 PROCdraw
  530 GCOL0,0
  540 VDU23,241,60,60,60,60,0,0,0,0
  550 VDU23,242,0,0,0,0,60,60,60,60
  560 VDU23,243,36,36,36,36,0,0,0,0
  570 VDU23,244,0,0,0,0,24,24,60,60
  580 VDU23,245,24,24,24,24,0,0,0,0
  590 VDU23,246,15,62,252,255,252,255
,62,15
  600 VDU23,247,240,124,63,255,63,255
,124,240
  610 VDU5
  620 GCOL0,0
  630 MOVE1155,725
  640 VDU241
  650 GCOL0,7
  660 VDU11,8,242
  670 MOVE1155,755
  680 VDU241
  690 GCOL0,7
  700 VDU11,8,242
  710 GCOL0,0
  720 MOVE1155,785
  730 VDU243
  740 GCOL0,7
  750 VDU11,8,244
  760 GCOL0,11
  770 MOVE1155,785
  780 VDU245
  790 GCOL0,12
  800 MOVE1200,793
  810 VDU246
  820 MOVE1105,793
  830 VDU247,4
  840 PROCpoint(6,1,18,1)
  850 COLOUR3:PRINTTAB(0,3)"What colo
ur cliffs ?"
  860 b%=GET
  870 GCOL0,b%+48
  880 VDU5
  890 GCOL0,3
  900 PROCdraw
  910 GCOL0,b%
  920 PROCfill(640,689,150)
  930 GCOL0,b%
  940 PROCdraw
  950 PROCfill(666,779,125)
  960 PROCtrees(0,812)
  970 PROCtrees(25,812)
  980 PROCtrees(75,806)
  990 PROCtrees(100,803)
 1000 PROCtrees(450,780)
 1010 PROCtrees(400,768)
 1020 PROCtrees(425,777)
 1030 PROCpoint(0,1,3,1)
 1040 COLOUR3:PRINTTAB(0,2)"Now the f
irst boat"
 1050 PRINTTAB(0,4)"lets paint the hu
ll"
 1060 PRINTTAB(0,6)"colour 1 or 2 ?"
 1070 c%=GET
 1080 GCOL0,c%+48
 1090 VDU5
 1100 PROCdraw
 1110 PROCpoint(12,1,18,1)
 1120 COLOUR3:PRINTTAB(0,2)"What colo
ur sails ?"
 1130 PRINTTAB(6,4)"5 or 7"
 1140 d%=GET
 1150 GCOL0,d%-48
 1160 GCOL0,3
 1170 VDU5
 1180 PROCdraw
 1190 GCOL0,3
 1200 MOVE300,500
 1210 DRAW300,970
 1220 MOVE300,525
 1230 DRAW575,525
 1240 GCOL0,d%
 1250 PROCdraw
 1260 GCOL0,1
 1270 MOVE315,970
 1280 MOVE315,955
 1290 PLOT 85,365,955
 1300 GCOL0,7
 1310 MOVE 315,950
 1320 MOVE 315,940
 1330 PLOT 85,365,950
 1340 PROCpoint(0,1,12,1)
 1350 COLOUR3:PRINTTAB(3,2)"Now boat
two"
 1360 PRINT TAB(3,4)"what colour ?"
 1370 e%=GET
 1380 VDU5
 1390 GCOL0,e%-48
 1400 PROCdraw
 1410 GCOL0,3
 1420 MOVE862,650
 1430 DRAW862,800
 1440 PROCpoint(0,1,18,1)
 1450 COLOUR3:PRINTTAB(0,2)"What colo
ur sails ?"
 1460 PRINTTAB(6,4)"1 or 7"
 1470 f%=GET
 1480 VDU 5
 1490 GCOL0,f%-48
 1500 MOVE867,660
 1510 MOVE960,660
 1520 PLOT85,867,792
 1530 PROCpoint(0,1,6,1)
 1540 COLOUR3:PRINTTAB(0,3)"  What co
lour sun"
 1550 PRINTTAB(6,5)"1 or 3 ?"
 1560 g%=GET
 1570 VDU5
 1580 GCOL0,g%-48
 1590 PROCcircle(1100,950,35)
 1600 PROCboy(525,543)
 1610 MOVE850,950
 1620 VDU 4
 1630 CLS
 1640 PROCpaint
 1650 COLOUR8:PRINTTAB(6,6)"2":COLOUR
7:PRINTTAB(9,6)"or":COLOUR15:PRINTTAB
(13,6)"4"
 1660 COLOUR 3:PRINTTAB(3,3)"How many
 birds ?"
 1670 VDU 5
 1680 f%=GET-48
 1690 IF f%=2 THEN GOTO 1720 ELSE GOT
0 1700
 1700 MOVE900,850
 1710 PROCbirds
 1720 MOVE50,875
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Seaside listing

From Page 169

```
 1730 PROCbirds
 1740 VDU4
 1750 CLS
 1760 CLS
 1770 PROCKEY
 1780 CLS
 1790 VDU23,225,12,12,0,0,12,12,0,0
 1800 VDU23,226,12,30,51,97,127,255,2
04,204
 1810 VDU23,227,0,0,0,128,128,192,192
,192
 1820 VDU23,228,2,3,15,15,2,0,12,12
 1830 VDU23,229,0,128,192,128,0,0,0,0
 1840 VDU23,230,0,0,12,30,0,0,51,51
 1850 VDU5
 1860 GCOL0,0
 1870 MOVE850,450
 1880 VDU225,8,10,226,227
 1890 GCOL0,3
 1900 VDU8,8,11,228,229,10,8,8,230
 1910 ENVELOPE1,7,0,0,0,6,3,4,13,-2,0
,-2,75,77
 1920 X=TIME+3000
 1930 REPEAT
 1940 SOUND0,1,RND(3)+3,20
 1950 SOUND&1000,0,0,RND(22)+36
 1960 UNTIL TIME>=X
 1970 VDU4
 1980 PROCKEY
 1990 MODE 7
 2000 PRINT TAB(7,2);CHR$(131);CHR$(1
41);"thank you children"
 2010 PRINT TAB(7,3);CHR$(129);CHR$(1
41);"thank you children"
 2020 PRINT TAB(8,9);CHR$(131);CHR$(1
41);"for painting me"
 2030 PRINT TAB(8,10);CHR$(129);CHR$(
141);"for painting me"
 2040 PRINT TAB(7,17);CHR$(131);CHR$(
141);"such a jolly boat"
 2050 PRINT TAB(7,18);CHR$(129);CHR$(
141);"such a jolly boat"
 2060 PRINT TAB(4,24)"Do you want ano
ther go Y/N "
 2070 RESTORE
 2080 IF GET$="Y"THEN GOTO 170 ELSE E
ND
 2090 DATA4,0,685,4,1300,685,85,0,0,8
5,1300,0,0,0,0,4,1200,685,5,1200,710,
85,1160,685,85,1160,710,85,1145,685,4
,1200,685,4,1200,710,85,1215,685,0,0,
0
 2100 DATA4,0,650,5,200,650,5,300,660
,5,500,665,5,700,670,5,950,680,5,1100
,682,5,1300,690,4,0,675,5,300,675,5,9
50,690,0,0,0
 2110 DATA4,0,779,5,400,775,5,700,750
,5,705,745,5,711,743,5,715,740,5,720,
725,5,735,723,5,740,719,5,765,713,5,7
80,709,5,802,695,0,0,0
 2120 DATA4,200,500,4,575,501,85,200,
425,85,575,425,4,575,425,4,575,500,85
,600,500,4,72,500,4,200,500,85,200,42
5,0,0,0,4,600,515,4,615,515,85,600,42
5,4,615,440,4,635,440,85,615,425,85,6
35,425,4,72,500,5,615,500,0,0,0
 2130 DATA 4,315,540,4,315,925,85,555
,540,4,285,525,4,285,875,85,75,525,0,
0,0,4,800,650,5,900,650,85,800,630,85
,900,630,4,800,650,5,800,630,85,777,6
50,0,0,0
 2150END
 5000 DEF PROCKEY
 5010 PRINT TAB(8,23)"Press a key to
go on"
 5020 dummy$=GET$
 5030 CLS
 5040 ENDPROC
 5050 DEF PROCpaint
 5060 VDU4
 5070 CLS
 5080 COLOUR1:PRINT TAB(0,0)"1":COLOU
R2:PRINT TAB(3,0)"2":COLOUR3:PRINT TA
B(6,0)"3":COLOUR4:PRINT TAB(9,0)"4":C
OLOUR5:PRINT TAB(12,0)"5":COLOUR6:PRI
NT TAB(15,0)"6":COLOUR7:PRINT TAB(18,
0)"7"
 5090ENDPROC
 5100 DEF PROCcloud(nx,ny)
 5110 MOVEnx,ny
 5120 GCOL0,7
 5130 PROCchara
 5140 PROCcharb
 5150 VDU242,243
 5160 VDU8,8,10,244,245
 5170 ENDPROC
 5180 DEF PROCwave(c,d,mx,my,r)
 5190 VDU23,248,0,0,0,0,0,28,56,231
 5200 FOR B%=1 TO r
 5210 MOVEd+RND(mx),RND(my)
 5220 GCOL0,c
 5230 VDU248
 5240 NEXTB%
 5250 ENDPROC
 5260 DEF PROCtrees(qx,qy)
 5270 MOVEqx,qy
 5280 GCOL0,2
 5290 PROCchara
 5300 VDU242,243,242,243
 5310 ENDPROC
 5320 DEF PROCfill(l,j,wx)
 5330 FOR wy=1 TO j
 5340 PLOT77,wx,wy
 5350 NEXT
 5360 ENDPROC
 5370 DEF PROCdraw
 5380 REPEAT
 5390 READ k,y,z
 5400 PLOT k,y,z
 5410 UNTIL k= 0
 5420 ENDPROC
 5430 DEF PROCpoint(e,f,g,i)
 5440 PROCpaint
 5450 COLOUR 8
 5460 PRINTTAB(e,f)"^"
 5470 COLOUR15
 5480 PRINTTAB(g,i)"^"
 5490 ENDPROC
 5500 DEF PROCcircle(xc,yc,r)
 5510 MOVExc+r,yc
 5520 FOR theta%=2 TO 360 STEP 8
 5530 x%=r*COS(RAD(theta%))
 5540 y%=r*SIN(RAD(theta%))
 5550 MOVExc,yc
 5560 PLOT85,xc+x%,yc+y%
 5570 NEXT
 5580 ENDPROC
 5590 DEF PROCboy(xs,ys)
 5600 MOVExs,ys
 5610 VDU23,251,28,34,34,34,0,0,0,0
 5620 VDU23,252,0,28,28,156,136,136,1
95,1
 5630 VDU23,253,1,1,0,0,0,0,0,0
 5640 VDU23,254,0,0,0,0,0,0,60,60
 5650 VDU23,255,60,60,0,0,0,0,0,0
 5660 VDU5
 5670 GCOL0,0
 5680 VDU251
 5690 GCOL0,7
 5700 VDU8,252,10,8,253
 5710 GCOL0,1
 5720 VDU8,11,254,10,8,255
 5730 ENDPROC
 5740 DEF PROCbirds
 5750 VDU23,224,0,0,195,36,60,24,0,0
 5760 GCOL0,7
 5770 VDU224,9,10,224
 5780 ENDPROC
 5790 DEF PROCchara
 5800 VDU23,242,0,0,0,1,7,15,63,127
 5810 VDU23,243,0,0,96,248,252,254,25
5,255
 5820 ENDPROC
 5830 DEF PROCcharb
 5840 VDU23,244,127,127,63,15,7,0,0,0
 5850 VDU23,245,255,255,252,252,248,9
6,0,0
 5860 ENDPROC
 5870 DEF PROCstart
 5880 VDU 28,0,31,19,24
 5890 CLS
 5900 VDU 24,0;265;1279;1023;
 5910 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 213.

From Page 101

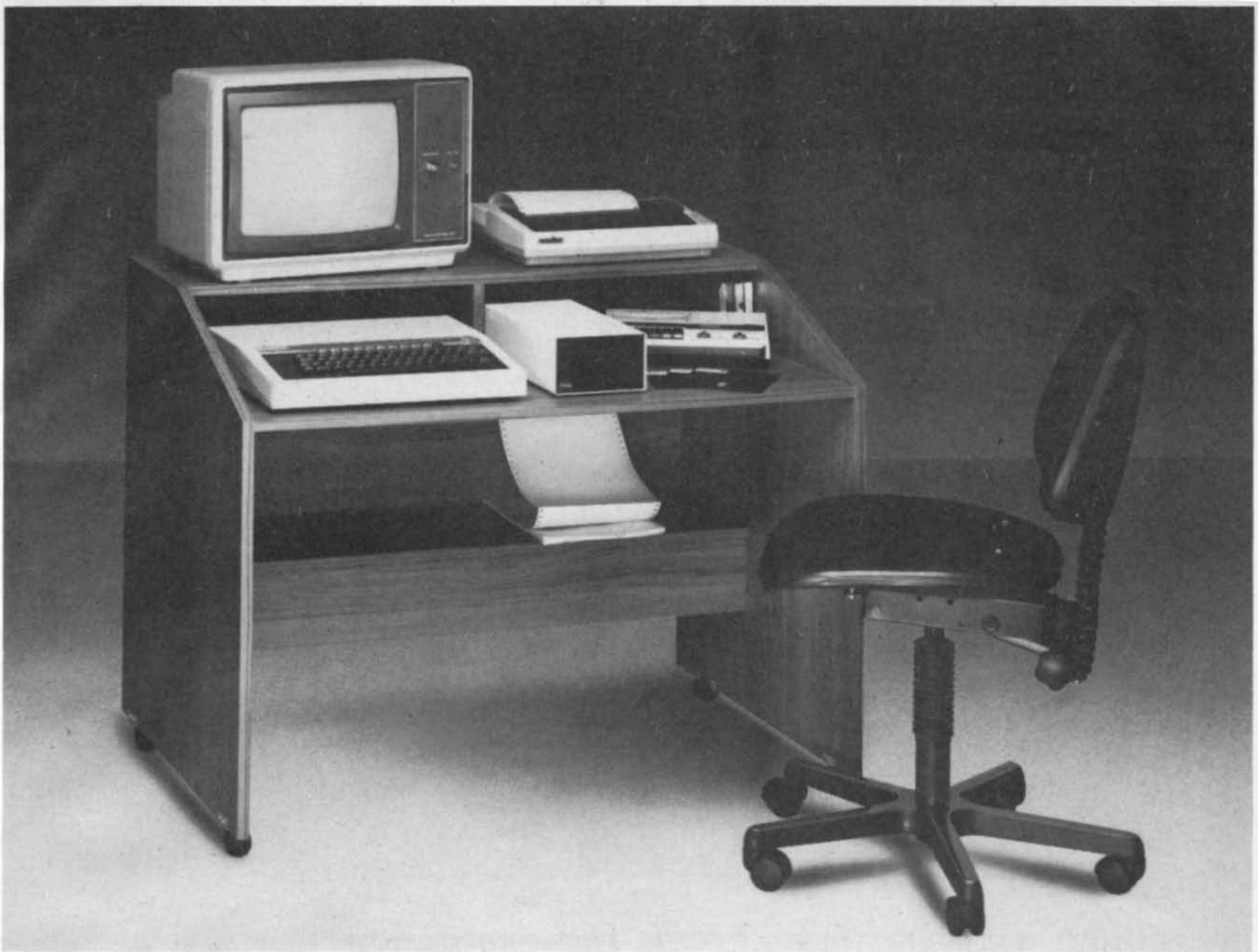
```
-32:PROCMAN:PROCMOVE(0,-32):M%=M%+1:P
ROCMAN
  280 ENDPROC
  290 DEFPROCMAN:GCOL3,3
  300 IFM%>225THENM%=224
  310 ?&72=M%:MOVEX%,Y%:CALLM:ENDPROC

  320 DEFPROCGREM:TI%=TI%-5
  330 IF TI% MOD 100 =0THENPROCSCORE(
TI%,34,16)
  340 GX%=X%-32:HX%=X%+48:GY%=Y%+48:H
Y%=Y%-32:GCOL3,2
  350 IFX%<A%THENV%=-ET%ELSEV%=ET%
  360 IFY%<B%THENW%=-ET%ELSEW%=ET%
  370 PROCCHECK:MOVEA%,B%:CALLT:A%=A%
+V%:B%=B%+W%:MOVEA%,B%:CALLT:ENDPROC

  380 DEFPROCCHECK
  390 IFPOINT(A%-4,B%-16)<>0THENV%=8
  400 IFPOINT(A%+32,B%-16)<>0THENV%=-
8
  410 IFPOINT(A%+16,B%-32)<>0THENW%=8
  420 IFPOINT(A%+16,B%+4)<>0THENW%=-8
  430 IFA%>GX%ANDA%<HX% AND B%<GY% AN
DB%>HY% ANDCV%<>1SOUND3,1,84,2:SC%=SC
%-10:PROCSCORE(SC%,34,10)
  440 ENDPROC
  450 DEFPROCEDGE:MOVE0,28:DRAW1036,2
8:DRAW1036,1000:DRAW0,1000:DRAW0,32:D
RAW1032,32:DRAW1032,996:DRAW4,996:DRA
W4,32:ENDPROC
  460 DEFPROCTHINK
  470 IFMV%=1THENC%=-32:D%=0:H%=-4:I%
=0
  480 IFMV%=2THENC%=32:D%=0:H%=36:I%=
0
  490 IFMV%=3THENC%=0:D%=32:H%=0:I%=4

  500 IFMV%=4THENC%=0:D%=-32:H%=0:I%=
-36
  510 F%=X%+C%:G%=Y%+D%
  520 IF HIT%=1 AND EE%=1THEN PROCSHA
TTER:ENDPROC
  530  IF POINT(F%+H%,G%+I%)<>0THENSO
UND0,-15,5,1:ENDPROC
  540 IF POINT(F%,G%)=3 THEN MOVEF%,G
%+8:GCOL0,0:PRINT"."
  550 PROCTOUCH:PROCTOUCHED
  560  IF POINT(F%+C%+H%,G%+D%+I%)<>0
 ANDBV%=1THENA%=F%+C%:B%=G%+D%:BV%=0:
SOUND0,-15,5,1:ENDPROC
  570 IFCV%<>1SOUND2,1,200,3
  580 REPEAT:PROCSHOVE:UNTIL POINT(F%
+H%,G%+I%)<>0
  590 IFBV%=1THENPROCRESTORE
  600 IFCV%<>1SOUND2,2,1,2
  610 IFPOINT(F%,G%)=3THENPROCCALLS
  620 ENDPROC
  630 DEFPROCSHOVE
  640 IFBV%=0THENPROCGREM ELSEPROCBum
ped:ENDPROC
  650 IFCV%=1THENPROCFANFARE
  660 GCOL3,E%:MOVEF%,G%:CALLS:F%=F%+
C%:G%=G%+D%:MOVEF%,G%:CALLS:PROCTOUCH
:PROCTOUCHED:ENDPROC
  670 DEFPROCBOX(XX%,YX%):GCOL0,2:MOV
EXX%,YX%:MOVEXX%+156,YX%:PLOT85,XX%+1
56,YX%+156:MOVEXX%,YX%+156:PLOT85,XX%
,YX%:ENDPROC
  680 DEFPROCMOVE(XY%,YY%)
  690 IF POINT(X%+Q%,Y%+R%)=2THENSOUN
D0,-15,5,1:ENDPROC
  700 IF POINT(X%+Q%,Y%+R%)=1 THEN E%
=1:?&70=227:EE%=1:PROCMAN:PROCTHINK:P
ROCMAN:ENDPROC
  710 IF POINT(X%+Q%,Y%+R%)=3 THEN E%
=3:?&70=237:EE%=0:PROCMAN:PROCTHINK:P
ROCMAN:ENDPROC
  720 X%=X%+XY%:Y%=Y%+YY%
  730 ENDPROC
  740 DEFPROCMESGA:LOCALX%,Y%:GCOL0,3
:CC%=0:REPEAT
  750 GCOL0,3:CC%=0:REPEAT
  760 X%=RND(960/32):Y%=RND(928/32)
  770 IFPOINT(X%*32+40,Y%*32+64)=0 TH
EN MOVEX%*32+40,Y%*32+64:VDU237:CC%=C
C%+1 ELSE GOTO760
  780 UNTIL CC%=3:ENDPROC
  790 DEFPROCSCORE(SCC%,S1%,S2%):VDU4
:COLOUR3:PRINTTAB(S1%,S2%);SCC%;" "
  800 IFSCC%<=0THEN GOTO820
  810 VDU5:ENDPROC
  820 *FX15,0
  830 FORLP%=1TO6000:NEXT:VDU5
  840 IFPT%>HI(1)THEN HI(1)=PT%
  850 IFLOP%=9THEN VDU4,12,5:GOTO130
  860 F%=X%:G%=Y%:JIK%=1:PROCSHATTER:
VDU4:PRINTTAB(12,13);"Game Over"
  870 *FX15,0
  880 IFINKEY(-99)THENVDU12,5:GOTO90
  890 GOTO880
  900 DEFPROCLINE(TX%,TY%,TZ%):JJ%=0:
FORLP%=TX% TO TY%STEPTZ%
  910 IFPOINT(LP%,G%)=3THENJJ%=JJ%+1:
GCOL0,2:MOVELP%,G%+8:PRINT"."
  920 NEXT
  930 IFJJ%=3THENPROCWIN
  940 ENDPROC
  950 DEFPROCWIN:LOP%=9:X%=328:Y%=320
:M%=224:A%=648:B%=512
  960 IF DAT%<7THEN DAT%=DAT%+1 ELSE
DAT%=1:ET%=16
  970 RESTORE 1240:FORCL%=1TO DAT%:RE
AD A,B,C:NEXT:BAG%=BAG%+1
  980 IF@%<236THEN@%=@%+1 ELSE@%=234:
VL%=2:ET%=12
  990 ?&71=@%
 1000 IFBOP%<400THEN BOP%=BOP%+50
 1010 VDU19,1,9;0;:SOUND1,-15,100,30:
VDU19,2,11;0;:SOUND2,-15,116,30:VDU19
,3,10;0;:SOUND3,-15,148,30:FORH%=1TO1
0000:NEXT:VDU19,1,A;0;19,2,B;0;19,3,C
;0;:REPEAT:TI%=TI%-5:UNTILTI%MOD100=0
:O%=0
 1020 FORLL%=1 TO TI% STEP50:PT%=PT%+
50:PROCSCORE(PT%,34,22):TI%=TI%-50:O%
=O%+1:SOUND1,3,O%,1:PROCSCORE(TI%,34,
16):NEXT:SC%=500:TI%=10000:ENDPROC
 1030 DEFPROCCALLS
 1040 PROCLINE(F%-32,F%+64,32)
 1050 PROCLINE(F%+32,F%-64,-32)
 1060 PROCLINEB(G%-32,G%+64,32)
 1070 PROCLINEB(G%+32,G%-64,-32)
 1080 IFJJ%=1 ANDSJ%=1 THENGCOL0,0:MO
VEF%,G%+8:PRINT"."
 1090 ENDPROC
 1100 DEFPROCLINEB(SX%,SY%,SZ%)
 1110 SJ%=0
 1120 FORSP%=SX% TO SY%STEPSZ%
 1130 IFPOINT(F%+4,SP%)=3THENSJ%=SJ%+
1:GCOL0,2:MOVEF%,SP%+8:PRINT"."
 1140 NEXT
 1150 IFSJ%=3THENPROCWIN
 1160 ENDPROC
 1170 DEFPROCFANFARE
 1180 READA,B
 1190 IFA=-2THENSOUND1,0,0,B/VL%:SOUN
D2,0,0,B/VL%:SOUND3,0,0,B/VL% ELSE SO
UND1,-15,A-100,B/VL%:SOUND2,-15,A-100
,B/VL%:SOUND3,-15,A-100,B/VL%
 1200 IFB=16THEN CV%=2
 1210 ENDPROC
 1220 DATA177,4,169,4,177,4,157,4,141
,4,157,4,129,4,-2,4,177,4,169,4,177,4
,157,4,141,4,157,4,129,4,-2,4,177,4,1
85,4,189,2,-2,2,185,2,189,2,-2,2,189,
2,177,4,185,2,-2,2,177,2,185,2,-2,2,1
85,2,167,4,177,4,161,4,141,4,161,4,17
7,6,-2,2
 1230 DATA 169,4,161,4,169,4,157,4,14
1,4,157,4,121,6,-2,2,157,4,149,4,157,
4,141,4,121,4,141,4,109,6,-2,2,157,4,
165,4,169,4,165,4,169,4,157,4,165,4,1
57,4,165,4,149,4,157,16
 1240 DATA 5,3,2,1,7,2,4,3,1,1,3,5,2,
7,4,6,3,1,4,6,3
 1250 DEFPROCBANG
 1260 PROCDOT
 1270 E1%=E1%+SS%:E2%=E2%-SS%:F1%=F1%
+SS%:F2%=F2%-SS%:E3%=E3%+(2*SS%):E4%=
```

→



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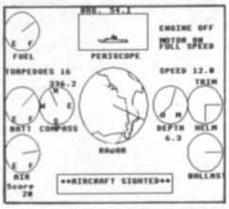

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Send large SAE for specification showing printout.
BEAMSCAN, 20 Vaughan Avenue, Hendon, London NW4 4HU.

From Page 172

```
E4%-(2*SS%)
 1280 PROCDOT
 1290 ENDPROC
 1300 DEFPROCSHATTER
 1310 GCOL0,2:MOVEF%,G%:VDU231:IF JIK
%=0THENPROCGREM
 1320 BIJ%=150:FORLL%=231 TO 227 STEP
-1:BIJ%=BIJ%-8:GCOL0,0:MOVEF%,G%:VDUL
L%:FORL%=1TO300:NEXT:SOUND2,2,BIJ%,1:
NEXT
 1330 GCOL3,2:SS%=8:E1%=F%+16:F1%=G%-
16:F2%=G%-16:E2%=F%+16:E3%=F%+16:E4%=
F%+16
 1340 SOUND0,3,6,5
 1350 FORLP%=1TO10:PROCBANG:NEXT:SS%=
4:FORLP%=1TO10:PROCBANG:NEXT
 1360 IFJIK%=0THENSC%=SC%-10:PROCSCOR
E(SC%,34,10)
 1370 PROCDOT:ENDPROC
 1380 DEFPROCDOT
 1390 PLOT69,E1%,F1%:PLOT69,E2%,F1%:P
LOT69,F%+16,F1%
 1400 PLOT69,E1%,F2%:PLOT69,E2%,F2%:P
LOT69,F%+16,F2%:PLOT69,E3%,G%-16:PLOT
69,E4%,G%-16
 1410 ENDPROC
 1420 DEFPROCBumped
 1430 GCOL3,E%:MOVEF%,G%:CALLS:GCOL3,
2:MOVEF%+C%,G%+D%:CALLT:F%=F%+C%:G%=G
%+D%:GCOL3,E%:MOVEF%,G%:CALLS:GCOL3,2
:MOVEF%+C%,G%+D%:CALLT
 1440 FORLP%=0TO30:NEXT:ENDPROC
 1450 DEFPROCRESTORE:FORLP%=1TO190:NE
XT:GCOL3,E%:MOVEF%,G%:CALLS:MOVEF%+C%
,G%+D%:GCOL3,2:CALLT
 1460 IFC%=32THENPROCSQASH(12,0,32,0,
232)
 1470 IFC%=-32THENPROCSQASH(-12,0,-20
,0,232)
 1480 IFD%=32THENPROCSQASH(0,12,0,20,
233)
 1490 IFD%=-32THENPROCSQASH(0,-12,0,-
32,233)
 1500 GCOL3,E%:MOVEF%+C%,G%+D%:CALLS
 1510 GCOL3,2:A%=8+(RND(31)*32):B%=51
2:MOVEA%,B%:CALLT:BV%=0
 1520 PT%=PT%+100:PROCSCORE(PT%,34,22
):SC%=SC%+10:PROCSCORE(SC%,34,10)
 1530 F%=F%+C%:G%=G%+D%
 1540 IFPOINT(F%,G%)=3THEN PROCCALLS
 1550 ENDPROC
 1560 DEFPROCSQASH(U1%,U2%,U3%,U4%,U5
%)
 1570 F%=F%+U1%:G%=G%+U2%
 1580 GCOL3,E%:MOVEF%,G%:CALLS
 1590 GCOL3,2:MOVEF%+U3%,G%+U4%:VDUU5
%
 1600 FORL=1TO500:NEXT
 1610 GCOL3,2:MOVEF%+U3%,G%+U4%:VDUU5
%:GCOL3,E%:MOVEF%,G%:CALLS
 1620 F%=F%-U1%:G%=G%-U2%
 1630 ENDPROC
 1640 DEFPROCTOUCH:AF%=F%-32:AG%=F%+6
4:BF%=G%+32:BG%=G%-64:ENDPROC
 1650 DEFPROCTOUCHED
 1660 IF A%>AF% AND A%<AG% AND B%<BF%
 AND B%>BG% THEN BV%=1:GCOL3,2:MOVEA%
,B%:CALLT:MOVEF%+C%,G%+D%:CALLT:H%=H%
+C%:I%=I%+D%:A%=1200:B%=512:SOUND1,4,
1,4:SOUND2,4,16,4:SOUND3,4,48,4
 1670 ENDPROC
 1680 DEFPROCMC
 1690 DIM PROG 50:P%=PROG
 1700 [OPT0
 1710 .S:LDA&70:JSR&FFEE
 1720 RTS
 1730 .M:LDA&72:JSR&FFEE:RTS
 1740 .T:LDA&71:JSR&FFEE:RTS:]
 1750 ENDPROC
 1760 *K.0*T.|MF.I%=0TO TOP-PA. S.4:I
%!&E00=I%!&1900:N.|MPA.=&E00|MEND|MLO
MEM=TOP|M*FX138,0,129|M
 1770 *K.1DELETE1760,2280|MG.50|M
 1780 REM.....BLOCKBUSTER.mk7......
MARK MELFORD ".....
 1800 REM.....(C).M.A.Melford......
 1810 MODE7
 1820 VDU23;8202;0;0;0;
 1830 PROCTITLE(7,1,"B L O C K B U S
T E R")
 1840 PRINTTAB(2,5);"KEYS:"
 1850  PRINTTAB(9,7)CHR$130;"UP";CHR$
131;"............";CHR$129;"*"
 1860  PRINTTAB(9,9)CHR$130;"DOWN";CH
R$131;"..........";CHR$129;"?"
 1870  PRINTTAB(9,11)CHR$130;"LEFT";C
HR$131;"..........";CHR$129;"Z"
 1880  PRINTTAB(9,13)CHR$130;"RIGHT";
CHR$131;".........";CHR$129;"X"
 1890  PRINTTAB(7,15)CHR$130;"BLAST";
CHR$131;"........";CHR$133;"RETURN"
 1900 PROCTITLE(12,22,"M.A.Melford")
 1910 *FX9,5
 1920 *FX10,5
 1930 ENVELOPE1,1,0,-2,-1,6,10,100,86
,0,0,-1,100,0
 1940 ENVELOPE2,1,35,-46,23,10,10,10,
126,-1,-1,-70,126,0
 1950 ENVELOPE3,1,0,0,0,0,0,0,100,0,-
1,-1,126,0
 1960 ENVELOPE4,1,8,-1,-2,30,50,50,12
6,0,0,-1,126,120
 1970 VDU5,19,1,5;0;19,3,2;0;23;8202;
0;0;0;
 1980 VDU19,1,5;0;
 1990 VDU23,224,28,42,28,72,127,21,52
,6
 2000 VDU23,225,28,42,28,9,127,84,22,
48
 2010 VDU23,227,255,195,165,153,153,1
65,195,255
 2020 VDU23,228,255,195,165,129,129,1
65,195,255
 2030 VDU23,229,255,129,129,129,129,1
29,129,255
 2040 VDU23,230,24,0,0,129,129,0,0,24
 2050 VDU23,231,0,60,90,102,102,90,60
,0
 2060 VDU23,232,32,112,112,168,168,21
6,168,112
 2070 VDU23,233,60,86,255,239,86,0,0,
0
 2080 VDU23,234,60,126,126,237,201,25
5,213,106
 2090 VDU23,235,153,126,90,255,165,21
9,102,60
 2100 VDU23,236,102,255,90,66,255,231
,219,126
 2110 VDU23,237,231,219,165,66,66,165
,219,231
 2120 VDU28,6,20,28,17
 2130 RESTORE2280:PROCTUNE
 2140 GOTO20
 2150 DEFPROCTITLE(A,B,C$)
 2160 PRINTTAB(0,B);CHR$(129);CHR$(15
7);" "
 2170 PRINTTAB(0,B+1);CHR$(133);CHR$(
157);" "
 2180 PRINTTAB(A,B);CHR$131CHR$141;C$
 2190 PRINTTAB(A,B+1);CHR$131CHR$141;
C$
 2200 ENDPROC
 2210 DEFPROCTUNE
 2220 FORLP%=1TO35
 2230 READA,B
 2240 IFA>255THENSOUND2,3,A-300,B*2:G
OTO2260
 2250 IFA=-2THENSOUND1,0,A,B*2 ELSE S
OUND1,3,A-45,B*2
 2260 NEXT
 2270 ENDPROC
 2280 DATA197,2,376,6,189,2,185,2,169
,2,368,10,-2,2,169,2,-2,2,364,6,169,2
,189,2,185,2,356,10,169,2,177,10,348,
6,157,2,165,2,169,2,356,10,165,4,169,
2,177,4,360,8,169,8,177,3,368,8,169,3
,161,2,185,2,376,12,177,2,169,2,217,6
```

This listing is included in this month's cassette tape offer. See order form on Page 213.

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EXPLORING ADVENTURES ON THE BBC MODEL B
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This is a complete look at the fabulous world of Adventure Games for the BBC Computer. Starting with an introduction to adventures, and their early history, it takes you gently through the basic programming necessary on the BBC before you can start writing your own games.

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Written by Carl Graham and edited by Nick Hampshire, publisher of *Commodore Computing International. £6.95*

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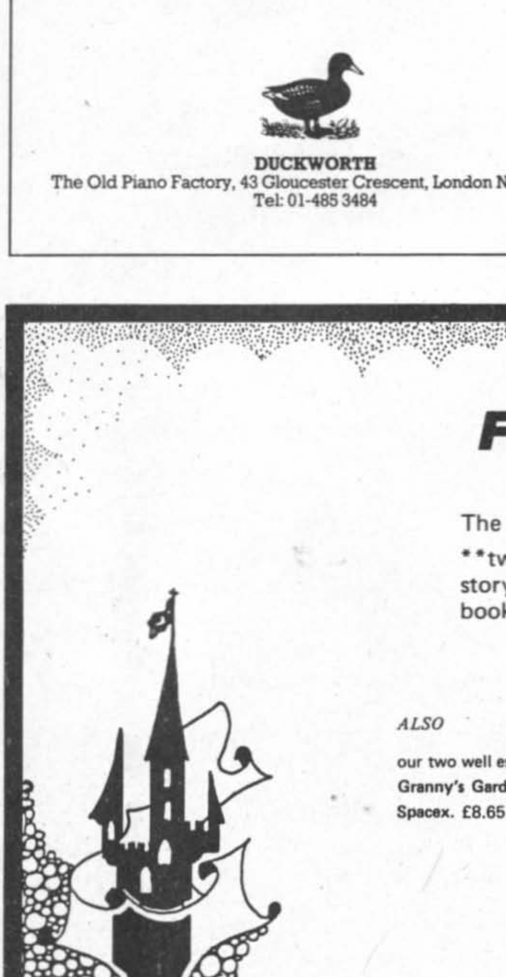

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Teletext listing

From Page 77

```
  210 ←
  220 OPT Q%
  230 .START
  240 LDA#0
  250 STA&7D;PADDING ZERO FOR DEFINIT
ION
  260 STA&70;TEXT ADDRESS LO
  270 LDA#10
  280 STA&71;TEXT ADDRESS HI
  290 LDA&83;GET SCREEN X,Y POS
  300 STA&81
  310 LDA#&7C;CALCULATE ADDRESS
  320 STA&82
  330 LDY&84
  340 .NXADD
  350 DEY
  360 BMI ADDRDONE
  370 LDA&81
  380 CLC
  390 ADC#40
  400 STA&81
  410 BCC NCARRY
  420 INC&82
  430 .NCARRY
  440 JMP NXADD
  450 .ADDRDONE
  460 LDY#0
  470 LDA&7E
  480 STA(&81),Y
  490 LDY#40
  500 STA(&81),Y
  510 LDY#80
  520 STA(&81),Y
  530 INC&81
  540 BNE NCARRY2
  550 INC&82
  560 .NCARRY2
  570 LDA&7F
  580 BEQ NSEPARTED
  590 LDY#0
  600 LDA#154
  610 STA(&81),Y
  620 LDY#40
  630 STA(&81),Y
  640 LDY#80
  650 STA(&81),Y
  660 INC&81
  670 BNE NCARRY3
  680 INC&82
  690 .NCARRY3
  700 .NSEPARTED
  710 LDA#255
  720 STA&72
  730 .NXLTTER
  740 LDA#&C0
  750 STA&85;RESET FLAG
  760 INC&72
  770 LDY&72
  780 LDA(&70),Y;GET LETTER
  790 BPL LEAVEFLAG
  800 LDX#&9
  810 STX&85
  820 .LEAVEFLAG
  830 CMP#13;FINISHED ?
  840 BNE NTEND
  850 RTS
  860 .NTEND
  870 SEC
  880 SBC#32
  890 LDX#0
  900 STX&74
  910 ASL A;CALCULATE ROM CHAR ADDRES
S
  920 ROL&74
  930 ASL A
  940 ROL&74
  950 ASL A
  960 ROL&74
  970 STA&73
  980 LDA&85
  990 CLC
 1000 ADC&74
 1010 STA&74
 1020 LDY#7
 1030 .NXROW
 1040 LDA(&73),Y
 1050 STA&75,Y
 1060 DEY
 1070 BPL NXROW
 1080 LDX#0;TOP ROW
 1090 LDY#0
 1100 .NXROW1
 1110 LDA#4
 1120 STA&80
 1130 .NXBLOCK
 1140 ASL&75,X
 1150 ROR A
 1160 ASL&75,X
 1170 ROR A
 1180 ASL&76,X
 1190 ROR A
 1200 ASL&76,X
 1210 ROR A
 1220 ASL&77,X
 1230 ROR A
 1240 LSR A
 1250 ASL&77,X
 1260 ROR A
 1270 LSR A
 1280 CLC
 1290 ADC#160
 1300 STA(&81),Y
 1310 INY
 1320 DEC&80
 1330 BNE NXBLOCK
 1340 TYA
 1350 CLC
 1360 ADC#36;DOWN A ROW
 1370 TAY
 1380 INX
 1390 INX
 1400 INX
 1410 CPX#9
 1420 BNE NXROW1
 1430 LDA&81
 1440 CLC
 1450 ADC#4;ACROSS 1 LETTER
 1460 STA&81
 1470 BCC NCARRY1
 1480 INC&82
 1490 .NCARRY1
 1500 JMP NXLTTER
 1510 →
 1520 NEXT
 1530 FOR X%=0 TO 18 STEP 3
 1540 PROCprint(X% MOD 7+1,X% AND 1,X
%,X%,"BBC")
 1550 NEXT
 1560 VDU 23,128,28,28,8,127,8,20,34,
65
 1570 PROCprint(6,0,0,18,"Me:"+CHR$(1
28))
 1580 PROCprint(2,1,13,0,"Me:"+CHR$(1
28))
 1590 PRINT TAB(0,23);
 1600 REPEAT UNTIL FALSE
 1610 REM
 1620 DEF PROCprint(C%,S%,X%,Y%,M$)
 1630 ?&7E=C%+144
 1640 ?&7F=S%
 1650 ?&83=X%
 1660 ?&84=Y%
 1670 $&A00=M$
 1680 CALL &900
 1690 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 213.

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THE BEEB BODY BUILDING COURSE

From Page 109

Listing I

```
   10 MODE4
   20 PRINT"BEEB BODY BUILDING COURSE
 No. 20"
   30 PRINT"Sound synthesiser using D
/A converter"
   40 PRINT"By Mike Cook"
   50 N%=32
   60 HIMEM=HIMEM-(N%*256+&200)
   70 DIM CO%(7,31), ANOTE% 65, CLI%
27
   80 PROC_INCODE
   90 PROC_NINT
  100 PROC_COFLS(0)
  110 REPEAT
  120 PROC_INS
  130 C$=GET$
  140 IF C$="V" THEN PROC_WLOOK
  150 IF C$="D" THEN PROC_WSETUP
  160 IF C$="C" THEN PROC_TCALC
  170 IF C$="P" THEN PROC_PLAY
  180 IF C$="L" THEN PROC_LOAD
  190 IF C$="S" THEN PROC_SAVE
  200 IF C$="H" THEN PROC_HAR
  210 UNTIL FALSE
  220 DEF PROC_INCODE
  230 ?&FE62=&FF :REM VIA OUTPUTS
  240 ?&FE6B=&40 :REM TIMER MODES
  250 ?&78=N%
  260 FOR A%=0 TO 2 STEP 2
  270 P%=HIMEM+1
  280 [
  290 OPT A%
  300 .SYNTH
  310 LDX &78
  320 LDA &79
  330 STA &72
  340 LDA &7A
  350 STA &73
  360 SEI
  370 LDA #&E0
  380 STA &FE6E
  390 LDA #50
  400 STA &FE64
  410 STA &FE66
  420 LDA #0
  430 STA &FE67
  440 STA &FE65
  450 .ST2 LDA #&FF
  460 STA &FE68
  470 LDA &76
  480 STA &FE69
  490 .HOLD LDA #&40
  500 .HOLD2 BIT &FE6D
  510 BEQ HOLD2
  520 STA &FE6D
  530 CLC
  540 LDA &74
  550 ADC &70
  560 STA &70
  570 LDA &75
  580 ADC &71
  590 STA &71
  600 LDY &71
  610 LDA (&72),Y
  620 STA &FE60
  630 LDA #&20
  640 BIT &FE6D
  650 BEQ HOLD
  660 STA &FE6D
  670 INC &73
  680 DEX
  690 BNE ST2
  700 LDA #&60
  710 STA &FE6E
  720 LDA #128
  730 STA &FE60
  740 CLI
  750 RTS
  760 NOP
  770 .TSTART
  780 ]
  790 NEXT
  800 ?&79=TSTART MOD 256
  810 ?&7A=TSTART DIV 256
  820 ENDPROC
  830 DEF PROC_NINT
  840 LOCAL F,FI,R
  850 FOR C%=1 TO 4
  860 RESTORE 1000
  870 FOR A%=ANOTE%+(C%-1)*14 TO ANOT
E%+(C%-1)*14+12 STEP 2
  880 READ F
  890 IF C%<>2 THEN F=F*2^(C%-2)
  900 FI=F*256*50E-6
  910 ?A%=INT(FI)
  920 T%=0
  930 R=FI-INT(FI)
  940 FOR B%=1 TO 8
  950 IF R>2^-B% THEN R=R-2^-B%:T%=T%
+2^(8-B%)
  960 NEXT
  970 A%?1=T%
  980 NEXT
  990 NEXT
 1000 DATA 261.6256,293.6648,329.6276
 1010 DATA 349.2282,391.9954,440.000
 1020 DATA 493.8833,523.2511
 1030 ENDPROC
 1040 DEF PROC_PLAY
 1050 CLS
 1060 PRINT TAB(0,11);"RETURN key to
end"
 1070 ?&76=&10
 1080 REPEAT
 1090 X%=GET
 1100 K%=2*(X% AND 31)
 1110 ?&74=ANOTE%?(K%+1)
 1120 ?&75=ANOTE%?K%
 1130 CALL SYNTH
 1140 UNTIL X%=13
 1150 ENDPROC
 1160 DEF PROC_WDISPLAY
 1170 FOR H%=0 TO NHAR%-1
 1180 PROC_HDISPLAY
 1190 NEXT
 1200 ENDPROC
 1210 DEF PROC_HDISPLAY
 1220 MOVE 156,1024
 1230 DRAW 156,508
 1240 DRAW 935,508
 1250 S%=0
 1260 U%=31
 1270 PROC_DISPART
 1280 ENDPROC
 1290 DEF PROC_WSETUP
 1300 L%=144
 1310 R%=344
 1320 A%=0
 1330 PRINT TAB(0,23);"9 To view all"
 1340 PRINT
 1350 PRINT"0 To return to menu"
 1360 PRINT
 1370 PRINT "HARMONIC TO VIEW  (1-";N
HAR%;")?";
 1380 H%=GET AND 15
 1390 IF H%<>9 AND H%>NHAR% THEN 1370
 1400 H%=H%-1
 1410 CLS
 1420 IF H%<0 THEN PROC_COFLS(1):ENDP
ROC
 1430 IF H%>7 THEN PRINT TAB(0,17);"H
EARS THE LOT THEN" : PROC_WDISPLAY :
GOTO 1370
 1440 PROC_HDISPLAY
 1450 PRINTTAB(0,19);"Use cursor keys
 to draw HARMONIC No. ";H%+1
 1460 PRINT"SPACE BAR alternates arro
ws"
 1470 PRINT"SHIFT held down increases
```

→

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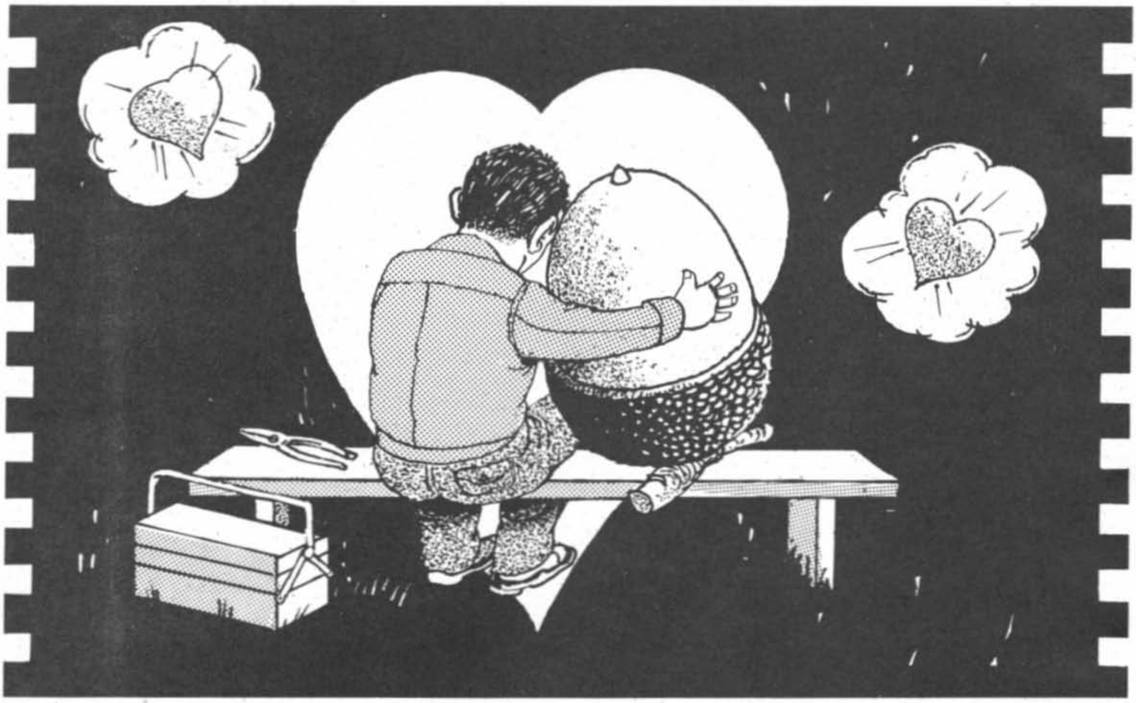

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From Page 179

```
 step size"
 1480 PRINT"RETURN to view a new harm
onic"
 1490 *FX4,1
 1500 VDU 5
 1510 MOVE L%,480:PRINT CHR$94
 1520 MOVE R%,480:PRINT CHR$94
 1530 PROC_AUPD
 1540 REPEAT
 1550 *FX15,0
 1560 A$=GET$
 1570 B%=ASC(A$)
 1580 IF A$=" " THEN PROC_AUPD:A%=A%
EOR 1:PROC_MARROW(A%,0)
 1590 IF B%=136 OR B%=137 THEN PROC_M
ARROW(A%,B%)
 1600 IF B%=138 OR B%=139 THEN PROC_A
DJUST
 1610 UNTIL B%=13
 1620 *FX4,0
 1630 VDU4
 1640 GOTO 1330
 1650 ENDPROC
 1660 DEF PROC_MARROW(A%,B%)
 1670 IF B%=136 THEN B%=-25
 1680 IF B%=137 THEN B%=25
 1690 GCOL 3,1
 1700 IF A% THEN MOVE L%,480 :L%=L%+B
% ELSE MOVE R%,480:R%=R%+B%
 1710 IF B%<>0 THEN VDU95,8,94
 1720 GCOL 0,1
 1730 IF L%<144 OR L%>919 THEN L%=L%-
B%
 1740 IF R%<144 OR R%>919 THEN R%=R%-
B%
 1750 MOVE L%,480:PRINTCHR$94
 1760 MOVE R%,480:PRINTCHR$94
 1770 PROC_AUPD
 1780 ENDPROC
 1790 DEF PROC_AUPD
 1800 GCOL 3,1
 1810 IF A% THEN MOVE L%,480 ELSE MOV
E R%,480
 1820 PRINT CHR$95
 1830 GCOL 0,1
 1840 ENDPROC
 1850 DEF PROC_ADJUST
 1860 IF R%=L% THEN ENDPROC
 1870 S%=(R%-144)/25
 1880 U%=(L%-144)/25
 1890 IF A% THEN Z%=U% ELSE Z%=S%
 1900 IF S%>U% THEN T%=S%:S%=U%:U%=T%
 1910 GCOL 0,0
 1920 PROC_DISPART
 1930 GCOL 0,1
 1940 IF B%=139 THEN B%=4 ELSE B%=-4
 1950 IF INKEY(-1) THEN B%=B%+8
 1960 CO%(H%,Z%)=CO%(H%,Z%)+B%
 1970 IF CO%(H%,Z%)>255 OR CO%(H%,Z%)
<0 THEN CO%(H%,Z%)=CO%(H%,Z%)-B%
 1980 T%=0
 1990 D=(CO%(H%,U%)-CO%(H%,S%))/ABS(U
%-S%)
 2000 FOR W%=S% TO U%
 2010 CO%(H%,W%)=CO%(H%,S%)+D*T%
 2020 T%=T%+1
 2030 NEXT
 2040 PROC_DISPART
 2050 ENDPROC
 2060 DEF PROC_DISPART
 2070 IF S%<>0 THEN F%=S%-1 ELSE F%=S
%
 2080 IF U%<>31 THEN T%=U%+1 ELSE T%=
U%
 2090 FOR D%=F% TO T%
 2100 X%=160+D%*25
 2110 Y%=CO%(H%,D%)*2+512
 2120 IF D%=F% THEN MOVE X%,Y% ELSE D
RAW X%,Y%
 2130 NEXT
 2140 ENDPROC
 2150 DEF PROC_COFLS(D%)
 2160 A%=TSTART+N%*256
 2170 IF D%=1 THEN ?A%=NHAR% ELSE NHA
R%=?A%
 2180 A%=A%+1
 2190 FOR W%=0 TO 31
 2200 FOR H%=0 TO 7
 2210 IF D%=1 THEN ?A%=CO%(H%,W%) ELS
E CO%(H%,W%)=?A%
 2220 A%=A%+1
 2230 NEXT
 2240 NEXT
 2250 ENDPROC
 2260 DEF PROC_TCALC
 2270 CLS
 2280 PRINT TAB(0,10);"This will take
 some time"
 2290 PRINT"First, calculating the sc
aling factor"
 2300 PRINT"For all ";N%;" tables"
 2310 PRINT"Working on:-"
 2320 MAX=0
 2330 HPI=PI/2
 2340 FOR T%=0 TO N%-1
 2350 PRINT TAB(0,14);"Table No.";T%+
1
 2360 FOR H%=1 TO 8
 2370 FOR P%=0 TO H%/2
 2380 F=HPI/H%+(2*PI*P%)/H%
 2390 CVAL=0
 2400 FOR B%=0 TO NHAR%-1
 2410 CVAL=CVAL+CO%(B%,T%)*SIN(F*(B%+
1))
 2420 NEXT
 2430 IF CVAL>MAX THEN MAX=CVAL
 2440 NEXT
 2450 NEXT
 2460 NEXT
 2470 PRINT
 2480 MAX=MAX+4
 2490 PRINT"NOW calculating the table
s"
 2500 PRINT
 2510 PRINT"This will take about ";NH
AR%*4;" Mins"
 2520 SF=127/MAX
 2530 A%=TSTART
 2540 FOR T%=0 TO N%-1
 2550 PRINT TAB(0,19);"Table No.";T%+
1
 2560 FOR F=0 TO 2*PI STEP 2*PI/255
 2570 CVAL=0
 2580 FOR B%=0 TO NHAR%-1
 2590 CVAL=CVAL+CO%(B%,T%)*SIN(F*(B%+
1))
 2600 NEXT
 2610 ?A%=127+SF*CVAL
 2620 A%=A%+1
 2630 NEXT
 2640 NEXT
 2650 SOUND 1,-15,65,12
 2660 ENDPROC
 2670 DEF PROC_WLOOK
 2680 CLS
 2690 PRINT"WAVEFORM PLOTTER"
 2700 PRINT TAB(0,8);"SPACE BAR for n
ext waveform"
 2710 PRINT"B - key for BACK"
 2720 PRINT"RETURN - to end"
 2730 A%=GET
 2740 IF A%=13 THEN ENDPROC
 2750 A%=TSTART
 2760 T%=0
 2770 REPEAT
 2780 CLS
```

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From Page 181

```
 2790 PRINT TAB(0,0);"WAVEFORM TABLE
No.";T%+1
 2800 MOVE 0,?A%*4
 2810 A%=A%+1
 2820 FOR X%=4 TO 1023 STEP 4
 2830 DRAW X%,?A%*4
 2840 A%=A%+1
 2850 NEXT
 2860 X%=GET
 2870 IF X%<>&42 THEN T%=T%+1 ELSE T%
=T%-1:A%=A%-512
 2880 IF T%<0 OR T%>(N%-1) THEN T%=0
 2890 IF T%=0 THEN A%=TSTART
 2900 UNTIL X%=13
 2910 ENDPROC
 2920 DEF PROC_SAVE
 2930 PROC_COFLS(1)
 2940 PROC_NAME("SAVE the table in")
 2950 $CLI%="SAVE T."+F$+" 3600 5800"
 2960 PROC_IMPLEMENT
 2970 ENDPROC
 2980 DEF PROC_LOAD
 2990 PROC_NAME("LOAD the table from"
)
 3000 $CLI%="LOAD T."+F$
 3010 ON ERROR GOTO 3060
 3020 PROC_IMPLEMENT
 3030 ON ERROR OFF
 3040 PROC_COFLS(0)
 3050 ENDPROC
 3060 REPORT
 3070 TIME=0
 3080 REPEAT:UNTIL TIME>300
 3090 RUN
 3100 DEF PROC_NAME(A$)
 3110 CLS
 3120 PRINT TAB(0,8);"WAVEFORM TABLE
STORAGE"
 3130 PRINT"Input file name to ";A$
 3140 INPUT F$
 3150 ENDPROC
 3160 DEF PROC_IMPLEMENT
 3170 X%=CLI% MOD 256
 3180 Y%=CLI% DIV 256
 3190 CALL &FFF7
 3200 ENDPROC
 3210 DEF PROC_HAR
 3220 REPEAT
 3230 INPUT"NUMBER OF HARMONICS TO US
E 1-8 ",NHAR%
 3240 UNTIL NHAR%<9 AND NHAR%>0
 3250 ?(TSTART+N%*256)=NHAR%
 3260 ENDPROC
 3270 DEF PROC_INS
 3280 CLS
 3290 PRINT"SOUND SYNTHESISER"
 3300 PRINT"Using ";NHAR%;" harmonics
"
 3310 PRINT
 3320 PRINT
 3330  PRINT"D - DRAW the harmonic en
velopes"
 3340 PRINT"C - CALCULATE the wavefor
ms"
 3350 PRINT"V - VIEW the waveforms in
 the table"
 3360 PRINT"P - PLAY the notes from t
he keyboard"
 3370 PRINT"H - Change the number of
HARMONICS used"
 3380 PRINT"S - SAVE the waveform tab
les"
 3390 PRINT"L - LOAD the waveform tab
les"
 3400 PRINT
 3410 PRINT"Make your choice"
 3420 ENDPROC
```

Listing II

```
   10 MODE4
   20 PRINTTAB(0,4);"BEEB BODY BUILDI
NG COURSE No. 20"
   30 PRINT"Sound synthesiser using D
/A converter"
   40 PRINT"TUNE PLAYER"
   50 PRINT"By Mike Cook"
   60 PRINT
   70 PRINT"Load in waveform tables a
nd then play"
   80 N%=32
   90 HIMEM=HIMEM-(N%*256+&200)
  100 DIM ANOTE% 96, CLI% 27
  110 octave$="cCdDefFgGaAb":REM CAPS
=# (C=c sharp)
  120 PROC_INCODE
  130 PROC_NINT
  140 REPEAT
  150 PROC_INS
  160 C$=GET$
  170 IF C$="P" THEN PROC_PLAY
  180 IF C$="L" THEN PROC_LOAD
  190 IF C$="T" THEN PROC_TUNE
  200 UNTIL FALSE
  210 DEF PROC_INCODE
  220 REM INITIALISE MACHINE CODE SEC
TION
  230 ?&FE62=&FF :REM VIA OUTPUTS
  240 ?&FE6B=&40 :REM TIMER MODES
  250 ?&78=N%
  260 FOR A%=0 TO 2 STEP 2
  270 P%=HIMEM+1
  280 [
  290 OPT A%
  300 .SYNTH \ SYNTHESISE A NOTE
  310 LDX &78 \ SET UP NUMBER OF TABL
ES TO USE
  320 LDA &79 \ SET UP ADDRESS OF
  330 STA &72 \ START OF WAVEFORM TAB
LES
  340 LDA &7A
  350 STA &73
  360 SEI \ DISABLE INTERRUPTS FROM T
HE SYSTEM
  370 LDA #&E0 \ ENABLE THE TWO TIMER
S
  380 STA &FE6E
  390 LDA #50 \ INITIALISE T1
  400 STA &FE64 \ LOW ORDER COUNT
  410 STA &FE66 \ LOW ORDER LATCH
  420 LDA #0
  430 STA &FE67 \ HIGH ORDER LATCH
  440 STA &FE65 \ START T1 RUNNING
  450 .ST2 \ START T2
  460 LDA #&FF
  470 STA &FE68
  480 LDA &76 \ VALUE FROM MEMORY
  490 STA &FE69
  500 .HOLD \ LOOP UNTIL T1 TIMEOUT
  510 LDA #&40
  520 .HOLD2 BIT &FE6D \ SEE IF T1 IS
 READY
  530 BEQ HOLD2
  540 STA &FE6D \CLEAR INTERRUPT FLAG
  550 \ MOVE ON THE ENTRY POINTER
  560 CLC
  570 LDA &74 \ INCREMENT VALUE
  580 ADC &70
  590 STA &70
  600 LDA &75
  610 ADC &71
```

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THE BEEB BODY BUILDING COURSE

From Page 183

```
  620 STA &71
  630 LDY &71 \ NUMBER OF ENTRY TO GE
T
  640 LDA (&72),Y \ GET ENTRY IN TABL
E GIVEN BY &72,&73
  650 STA &FE60 \ OUTPUT IT TO D/A
  660 LDA #&20 \ LOOK FOR T2 TIMEOUT
  670 BIT &FE6D
  680 BEQ HOLD \ NEXT ENTRY IF NOT TI
MED OUT
  690 STA &FE6D \ RESET INTERRUPT FLA
G
  700 INC &73 \ MOVE TABLE ONTO THE N
EXT ONE
  710 DEX \ TABLES TO GO VALUE
  720 BNE ST2 \ BACK TO START T2 AGAI
N
  730 LDA #&60 \ DISABLE THE TWO TIME
RS
  740 STA &FE6E
  750 LDA #128 \ SET OUTPUT TO MID PO
INT
  760 STA &FE60
  770 CLI \ ENABLE SYSTEM INTERRUPTS
  780 RTS
  790 NOP \ SPACE FOR NUMBER OF HARMO
NICS
  800 .TSTART \ START OF WAVEFORM TAB
LES
  810 ]
  820 NEXT
  830 ?&79=TSTART MOD 256
  840 ?&7A=TSTART DIV 256
  850 ENDPROC
  860 DEF PROC_NINT
  870 LOCAL F,FI,R
  880 FOR C%=1 TO 4
  890 RESTORE 1030
  900 FOR A%=ANOTE%+(C%-1)*24 TO ANOT
E%+(C%-1)*24+22 STEP 2
  910 READ F
  920 IF C%<>2 THEN F=F*2^(C%-2)
  930 FI=F*256*50E-6
  940 ?A%=INT(FI)
  950 T%=0
  960 R=FI-INT(FI)
  970 FOR B%=1 TO 8
  980 IF R>2^-B% THEN R=R-2^-B%:T%=T%
+2^(8-B%)
  990 NEXT
 1000 A%?1=T%
 1010 NEXT
 1020 NEXT
 1030 DATA 261.6256,277.18,293.6648,3
11.13
 1040 DATA 329.6276,349.2282,369.99,3
91.9954
 1050 DATA 415.31,440.000,456.16,493.
8833
 1060 ENDPROC
 1070 DEF PROC_PLAY
 1080 CLS
 1090 PRINT TAB(0,8);"Play the keyboa
rd"
 1100 PRINT"SPACE changes the octave"
 1110 PRINT TAB(0,12);"RETURN key to
end"
 1120 L$="AWSEDFTGYHUJKOLP;:[]"
 1130 ?&76=&10
 1140 P%=0
 1150 REPEAT
 1160 X$=GET$
 1170 A%=INSTR(L$,X$)
 1180 IF A%=0 THEN 1230
 1190 A%=(A%-1+P%)*2
 1200 ?&74=ANOTE%?(A%+1)
 1210 ?&75=ANOTE%?A%
 1220 CALL SYNTH
 1230 IF X$=" " THEN P%=P%+12: PRINT
TAB(0,10);"OCTIVE ";(P%/12)+1
 1240 IF P%=48 THEN P%=-12:GOTO 1230
 1250 UNTIL X$=CHR$13
 1260 ENDPROC
 1270 DEF PROC_SOUND(F%,L%)
 1280 K%=2*((F%-1)DIV4)-2
 1290 IF K%>193 THEN ENDPROC
 1300 ?&74=ANOTE%?(K%+1)
 1310 ?&75=ANOTE%?K%
 1320 ?&76=L%*6
 1330 CALL SYNTH
 1340 ENDPROC
 1350 DEF PROC_INS
 1360 CLS
 1370 PRINT"SOUND SYNTHESISER"
 1380 PRINT
 1390 PRINT
 1400 PRINT"P - PLAY the notes from t
he keyboard"
 1410 PRINT"L - LOAD the waveform tab
les"
 1420 PRINT"T - play a TUNE"
 1430 PRINT
 1440 PRINT"Make your choice"
 1450 ENDPROC
 1460 DEF PROC_LOAD
 1470 PROC_NAME("LOAD the table from"
)
 1480 $CLI%="LOAD T."+F$
 1490 PROC_IMPLEMENT
 1500 ENDPROC
 1510 DEF PROC_NAME(A$)
 1520 CLS
 1530 PRINT TAB(0,8);"WAVEFORM TABLE
STORAGE"
 1540 PRINT"Input file name to ";A$
 1550 INPUT F$
 1560 ENDPROC
 1570 DEF PROC_IMPLEMENT
 1580 X%=CLI% MOD 256
 1590 Y%=CLI% DIV 256
 1600 CALL &FFF7
 1610 ENDPROC
 1620 DEFPROC_TUNE
 1630 RESTORE 1750
 1640 Q%=0
 1650 READ N$
 1660 IF N$="END" THEN ENDPROC
 1670 IF LEFT$(N$,1)="O" THEN Q%=VAL(
RIGHT$(N$,1)):GOTO1650
 1680 T%=VAL(RIGHT$(N$,1))
 1690 A$=LEFT$(N$,1)
 1700 F%=INSTR(octave$,A$)*4+1+48*(Q%
-1)
 1710 PRINT N$,A$,T%
 1720 PROC_SOUND(F%,T%*4)
 1730 GOTO1650
 1740 REM * WHEELS CHAR-CHAR *
 1750 DATA O2,b3,g1,O3,d3,O2,b1,O3,g2
,F2,e1,d1,O2,b1,g1
 1760 DATA O3,c3,O2,a1,O3,d3,c1,F2,e2
,d1,c1,O2,F1,a1
 1770 DATA O2,b3,g1,O3,d3,O2,b1,O3,g2
,F2,e1,d1,O2,b1,g1
 1780 DATA O3,c1,O2,F1,a1,O3,c1,e1,d1
,O2,e1,F1,g4
 1790 DATA END
```

This listing is included in this month's cassette tape offer. See order form on Page 213.

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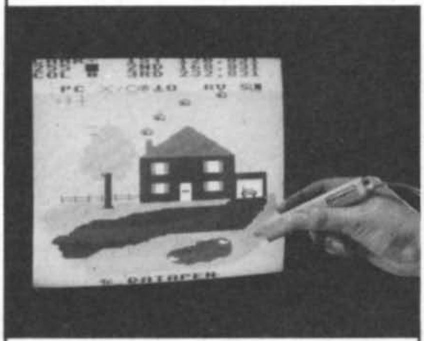
Datapen



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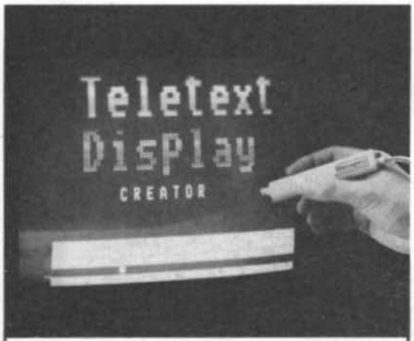

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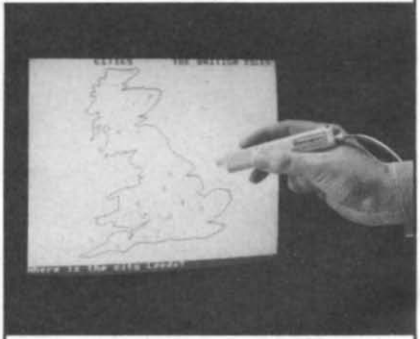

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Hants. RG25 3JB (0256 770488)

Duel listing

From Page 85

```
  680 DEFFNboardL(OD%)
  690 LOCALC%
  700 D%=0
  710 D%=((INKEY(-17))*-1)
  720 IFD%=0 D%=((INKEY(-83))*-2)
  730 IFD%=0 D%=((INKEY(-67))*-4)
  740 IFD%=0 D%=((INKEY(-66))*-3)
  750 IFD%=0 =OD%
  760 =D%
  770 REM**********************
  780 DEF PROCreadch(H%,V%)
  790 T%=((?(HIMEM+(2*H%+V%*80)*8)) AND 240)/16:IFT%=0 T%=(?(HIMEM+(2*H%+V%*80)*8)) AND 15
  800 S%=((?(HIMEM+(2*H%+V%*80+80)*8)) AND 240)/16:IFS%=0 S%=(?(HIMEM+(2*H%+V%*80+80)*8)) AND 15
  810 ENDPROC
  820 REM**********************
  830 DEFPROCgraphics
  840 VDU23,224,51,51,204,204,51,51,204,204
  850 VDU23,225,128,128,128,128,128,128,128,255
  860 VDU23,226,255,255,255,255,255,255,255,255
  870 VDU23,227,0,0,0,0,66,102,60,24
  880 VDU23,1,0;0;0;0;
  890 S1%=0:S2%=0
  900 board=FALSE:paddle=FALSE
  910 ENDPROC
  920 REM**********************
  930 DEFPROCleftcrash
  940 VDU19,1,9,0,0,0:S2%=S2%+1:PROCscore
  950 VDU19,1,1,0,0,0,17,3
  960 IF S2%=10 PROCwinner
  970 ENDPROC
  980 REM**********************
  990 DEFPROCrightcrash
 1000 VDU19,2,10,0,0,0:S1%=S1%+1:PROCscore
 1010 VDU19,2,2,0,0,0,17,3
 1020 IF S1%=10 PROCwinner
 1030 ENDPROC
 1040 REM**********************
 1050 DEFPROCgrid
 1060 COLOUR3:COLOUR128
 1070 FORF%=0TO28 STEP28:FORI%=0TO39:PRINTTAB(I%,F%);CHR$226:NEXTI%:NEXTF%
 1080 FORF%=1 TO 27:PRINTTAB(0,F%);CHR$226;:FORI%=1TO38:PRINTCHR$225;:NEXTI%:PRINTCHR$226:NEXTF%
 1090 F%=1:FORI%=1TO38:PRINTTAB(I%,F%);CHR$224:NEXTI%
 1100 F%=29:FORI%=0TO39:PRINTTAB(I%,F%);CHR$224:NEXTI%
 1110 X%=15:Y%=14:A%=24:B%=14:L%=2:R%=4
 1120 ENDPROC
 1130 REM**********************
 1140 DEFPROCscore
 1150 TIME=0:REPEATUNTILTIME=75
 1160 *FX21,5
 1170 *FX21,7
 1180 *FX21,0
 1190 COLOUR3
 1200 PRINTTAB(15,13);"Player 1 = ";S1%;TAB(15,16);"Player 2 = ";S2%
 1210 IF board PRINTTAB(6,28);"Press spacebar to continue" ELSE PRINTTAB(6,28);"Press fire button to continue"
 1220 IF(S1%=10) OR (S2%=10) ENDPROC
 1230 REPEAT
 1240 UNTIL INKEY(-99) OR (ADVAL(0)AND3)<>0
 1250 ENDPROC
 1260 REM**********************
 1270 DEFPROCwinner
 1280 PRINTTAB(10,25);"Player ";:IF(S1%=10) PRINT"1";
 1290 IF(S2%=10) PRINT"2";
 1300 PRINT" has won...."
 1310 S1%=0:S2%=0
 1320 REPEAT
 1330 FORF%=0TO39:PRINTTAB(F%,28);CHR$226;:NEXTF%
 1340 PRINTTAB(8,28);"Press RETURN to continue"
 1350 FOR PAUSE=1 TO 1000:NEXT
 1360 FORF%=0TO39:PRINTTAB(F%,28);CHR$226;:NEXTF%
 1370 UNTIL(INKEY(10))=13
 1380 ENDPROC
 1390 REM**********************
 1400 DEFPROCsound
 1410 ENVELOPE2,3,2,-4.4,5,5,5,127.0,0,0,60,0
 1420 SOUND1,2,1,10
 1430 SOUND3,2,200.1
 1440 ENDPROC
 1450 REM**********************
 1460 DEFPROCinstruct
 1470 VDU23,1;0;0;0;0;
 1480 PRINTTAB(17);"DUEL"
 1490 PRINT'''
 1500 PRINTTAB(8);" THE TWO PLAYER GAME"
 1510 PRINT'''"Your player has been placed on the game"
 1520 PRINT"  board, you must  not  hit the  walls,"
 1530 PRINT"  your own or your opponent's ion trail."
 1540 PRINT'"The object is to force your opponent "
 1550 PRINT"  into an error, such as hitting an"
 1560 PRINT"  ion trail or the wall"''''
 1570 PRINT
 1580 PRINTTAB(12,30);"Hit the space bar"
 1590 PROCbar
 1600 CLS
 1610 PRINTTAB(17);"DUEL"
 1620 PRINTTAB(0,2);"The game can be played using two methods"''"   1. Paddles"''"   2. Keyboard : use keys as shown"
 1630 FORF%=1TO16
 1640 READkey,xpos,ypos
 1650 PRINTTAB(xpos,ypos);CHR$(key)
 1660 NEXT
 1670 PRINTTAB(2,18)"Left player";TAB(28,18);"Right player"
 1680 PRINTTAB(15,19);"Please press "''SPC(13)"'P' for Paddles"''SPC(13)"'K' for Keyboard"
 1690 PRINTTAB(5,27);"'S' for sound : 'Q' for quiet"
 1700 PRINTTAB(12,30);"Hit the space bar"
 1710 sound=1
 1720 REPEAT
 1730 REPEAT
 1740 IF INKEY(-71)board=TRUE:paddle=FALSE
 1750 IF INKEY(-56)paddle=TRUE:board=FALSE
 1760 IF INKEY(-17)sound=0
 1770 UNTILpaddle OR board
 1780 *FX15
 1790 UNTILINKEY(-99)
 1800 CLS
 1810 ENDPROC
 1820 END
 1830 DEFPROCbar
 1840 *FX21,0
 1850 REPEATUNTILGET=32
 1860 ENDPROC
 1870 DATA81,7,11,94,7,10,65.7,14,227,7,15,88,3,12,60,2,12,67,11,12,62,12,12
 1880 DATA91,32,11,94,32,10,42,32,14,227,32,15,44,28,12,60,27,12,46,36,12,62,37,12
```

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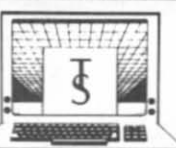

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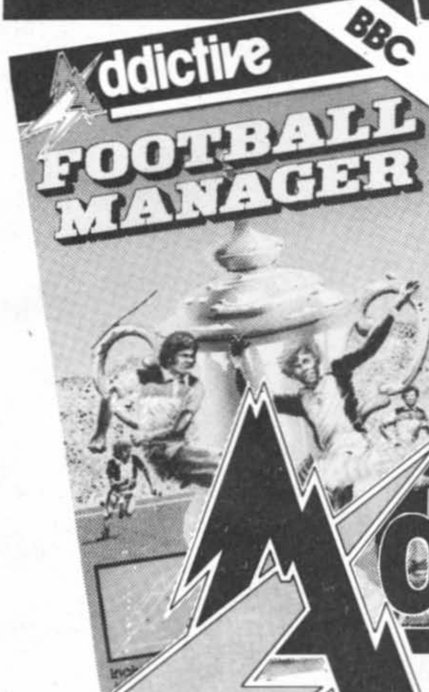

Football Manager

Designed by Kevin Toms

This outstanding game of skill and strategy is now widely available and you can join the many thousands of satisfied customers who have purchased the game. This is no five minute wonder – you will be playing this game for hours over many weeks (we know – our customers tell us!).

Kevin Toms

Some of the features of the game:–

- ★ Matches in 3D graphics ★ Transfer market
- ★ Promotion and relegation ★ F.A. Cup matches
- ★ Injury problems ★ Full league tables
- ★ Four Divisions ★ Pick your own team for each match
- ★ As many seasons as you like
- ★ Managerial rating
- ★ 7 skill levels
- ★ Save game facility

Addictive

* Home Computing Weekly BBC Charts 4 Weeks at No. 1.

Programmers
We want your software. Send us a sample. If accepted, we will supply generous royalties plus free advice from Kevin himself!

Football Manager from Addictive Games should send soccer fans 'over the moon' but the game scores highly with non-enthusiasts, too.

As manager of your favourite team, it is your job to decide each week who will play in the next match on the fixture list, whether to buy or sell players, and whether to borrow money or repay a loan according to the club's financial fortunes.

Whichever team you choose, you start in division four. By the end of 22 League matches, you hope to be promoted to division one and possibly win the FA Cup as well. If the team closest to your heart is not available, the game allows you to customise the data file to include your own team and players.

Among the many other options offered are seven skill levels ranging from beginner to genius. If you start as a beginner and do well, your rating is adjusted automatically at the end of the season. The most crucial decision affecting your team's performance, however, involves the selection of players and it is based on the attributes of the two opposing teams. Their energy, morale, defence and attacking strength are valued on a scale of points, and players are chosen according to positional skills and energy they can bring to the team. True to life, players' energy is depleted after a game and restored after a rest.

Having settled all the details, you can then sit back and watch the game – a short, animated sequence showing the 'highlights'. Scores, injuries and new league placings are all displayed at the end.

The combination of graphic action and informed decision-making distinguishes Football Manager from many other strategy games and the scope and careful presentation of the program make it entertaining and absorbing.

(Acorn Programs – August/September 1984)

DIVISION ONE

As Automata have also proved, Addictive Games has shown that it is possible to write excellent programs in Basic – Football Manager started life as a ZX81 program ages ago and is still going strong.

The latest version is the most impressive yet; running as it does on the BBC B, the action is fast and the animated football sequences most impressive. On the BBC the little men have evolved from match-sticks to Subbuteo figures. Another addition is the provision of a fixture list which you can consult.

Apart from that, it only remains to summarise the game for those people who don't know it. As a football manager you choose the teams buying the players, deciding who to play, keeping morale high and basically living out your footballing fantasies as you try to move your team up the divisions.

Matches are decided according to a vast number of factors, only one of which is luck, and you get to see the highlights of each game.

Quite honestly, John, I think you're going to be over the moon about this one unless you're strictly TT on footballing matters in which case you'll probably be sick as a parrot, squire.

(Popular Computing Weekly).

Available from software stockists nationwide, including WHSMITH Boots & John Menzies

Prices:		
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QUAL-SOFT comments: In 1982/83 it was only necessary to throw together a few M/C code routines, record them on a cassette, produce a flashy cassette insert, and it sold. But as we approach 1985, BBC users have become much more discriminating in their choice of software. Customers demand something more satisfying than a few hours of high adrenalin action. They demand, not hours, but tens of hours, even a hundred hours plus, of "playability". They demand that the program challenges their intellect and not just their reflexes. They demand QUALITY games. For the 84/85 season; for these customers, QUAL-SOFT is proud to offer these games:

"DIVISION ONE '85" and "SOCCER SUPREMO" are direct descendants of the 1983 game "LEAGUE DIVISION ONE", but they are a significant advance on what was described as "by far the best game for the BBC Micro". They are soccer management SIMULATIONS! Soccer management is about ASSESSMENT; assessment of the opposition strengths, of your players and their skills, of the effectiveness of the teams you assemble, of the value of transfer listed players, of the potential of your own youngsters. Soccer management is about EXPERIMENTATION; experimentation with players, with blends of players, with team formations, with tactical ploys. QUAL-SOFT's unique soccer match simulation, with tackles, passes, shots, saves etc. all simulated within your micro, and the results displayed in graphical form on your screen, allows ASSESSMENT and EXPERIMENTATION to be carried out. The result is a 2ND GENERATION soccer management SIMULATION, not an exercise in mental arithmetic.

BBC 'B'
(all OS)

DIVISION ONE '85'

TAPE £9.95
DISC £12.95
(all inc.)

This is an uncompromising strategy/tactics simulation, it will test to the full your knowledge of the game and your ability to use it to build a winning side. As described above, your ability to experiment and judge the results are paramount. Injuries, suspensions, long term "form" changes, short term "form" fluctuations, will all conspire to confuse and defeat you. You will also meet the problems of financial limitations as you choose between the 33 players available to you. You have a contract for 5 seasons, which will be terminated if your side is relegated. This game is the supreme test of your managerial skills, short of the real thing.

ELECTRON
BBC 'B' (all OS)

SOCCER SUPREMO

TAPE £9.95
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Soccer Supremo has been improved over the original game in the direction of a much more realistic "3D", 22 MAN, FULL PITCH match simulation for each of your games. The game is still a significant challenge to your managerial skills, but the balance is more towards enjoyment and entertainment than all out strategy. But with 30 players to choose from, restricted finances, and just a 5 season contract, the 1st Division Championship is not an easy task.

COMBO OFFER. Telephone conversations, and orders, have shown that customers find it very difficult to choose between the two games. Our COMBO tape/disc offers you both games for just £3 extra. £12.95 or £15.95. PREVIOUS OWNERS. Send in your ORIGINAL tape/disc of LEAGUE DIVISION ONE, with manuals, and receive £7 for your tape or £9 for your disc, discount against any order for the above game(s).

BBC 'B'
(all OS)

PORTFOLIO

TAPE £9.95
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The most popular indoor games have always been multi-player board games, and yet designers have insisted on producing single player "me and my micro" computer games. In the USA the balance has already shifted away from the "arcade mentality" towards multi-player programs. PORTFOLIO is an investment game for 1-4 players, or teams of players. Each player/team begins with £1,000 and invests his money in a variety of companies against a background of continually changing international, national and commercial news. The news items affect the share values of the companies in a variety of different ways, and the players must shift their money around to maximise their investments; maybe even to become a millionaire.

The game is an ideal family game, or perfect in the classroom with a high pupil/micro ratio. It's suitable for 12 years old and above, though younger do enjoy the game with some help from their friends, and in this game, competitors. For the adult we have made some of our news items somewhat cryptic, occasionally even red herrings, to really make them think about the effect on share values. Because we call it a family game we have tried to see that there is something in it for all members of the family. Teachers can even tailor the news items to suit the capabilities of the pupils.

So why not set your Beeb on the coffee table, connect it to the TV set and play against the rest of the family or your friends on these cold, wet winter nights that are approaching. It might even bring back the art of conversation (as against BASIC statements).

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MICROMAIL

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CASTLE
OF
FEAR

Castle of Fear keeps its secrets

I WOULD just like to say thank you for the descriptions of how the programs published in The Micro User work.

But what happened to the description of Castle of Fear, The Micro User August 1984?

It's needed desperately. Hope you can find it for me. – **Andy Reader, Potters Bar, Herts.**

● Unfortunately, Castle of Fear, being an adventure game, has to keep its little secrets. Even telling you that describing how the program works is giving something away, is giving something away!

So far, nobody has actually told us if they've managed to survive. It can't be that hard, can it?

Database for handicapped

WE are in the process of establishing a database of software for the handicapped – Bardsoft.

Briefly, each entry to the database will contain a description of the programs, the handicaps they are suitable for, the type of computer system required, name and address of supplier/developer and price, etc.

This information will be made available through printouts in answer to specific enquiries.

The aim of Bardsoft will be to facilitate the exchange of information on software relevant to any aspect of the lives of handicapped people. One major addition will be the concerted effort to promote the database, and therefore the software, abroad.

This is what we have been doing successfully for non-software products in the field.

As we are currently collecting and processing information, we would be pleased to hear from any of your readers who may wish to contribute to Bardsoft.

For further information please contact me. – **P. Curran, Handicapped Persons Research Unit, Newcastle upon Tyne Polytechnic, No. 1 Coach Lane, Coach Lane Campus, Newcastle upon Tyne NE7 7TW.**

Formatter failure

I FOUND the teletext screen dump routine in your September 1984 issue superb!

But I would like to point out that your listing formatter has introduced a space into line 1490. The program will fail to work unless the space is deleted.

Try replacing 'OR A' with 'ORA'. I hope this helps the non machine code programmers who did not notice the mistake. – **Andrew Farrow, Walkeley, Sheffield.**

● Well spotted! Our late, unlamented formatter let us down there. We hope it didn't cause any serious heartache.

Olympic ordeals . . .

I WOULD like to compliment you on your excellent game Micro Olympics. However, I have but one complaint, couldn't you make some of the events a little more competitive?

For instance, to achieve the necessary running speeds to be competitive with the micro, at the pole vault and long jump, you must need to be bionic!

Surely if I can run 100 metres in 9.42 seconds I could just about gather enough speed to vault above 4.5m or jump more than 6.10m?

In addition to these alterations being made, further editions of the game could contain events such as the hurdles and shot putt, maybe even a decathlon style points system could be incorporated?

Anyway Micro Olympics is still an exceptional game and below I have listed my personal best score for each of the events.

100m	*9.42 secs.*
200m	*20.12 secs.*
400m	*46.66 secs.*
800m	*2:01.6 secs.*
1500m	*3:51:93 secs.*
Javelin	*100.11m*
Discus	*72.18m*
Hammer	*85.09m*
Long Jump	*6.10m*
High Jump	*2.40m*
Pole Vault	*4.50m*

Yours with very tired fingers. – **Paul Vanags, Mansfield, Notts.**

Olympic spirit . . . ?

IS 6.72 seconds in the Micro Olympics 100m impossible?

Well, impossible has been made possible – I have found out a way to beat the micro every time.

Apart from having a partner and each individual pressing like mad at their key, I have discovered an ever effective way of beating the micro and it's guaranteed to work every time.

First, the keyboard repeat delay and repeat period must be quickened before loading the program:

```
*FX 12,1
*FX 11,10
```

This sets the repeat delay to one-tenth of a second and the repeat period to one-hundredth of a second.

Next, load the Micro Olympics running program. When it has loaded, use Z and z (other letters may be used) for your feet and turn the caps lock off.

All you need do now, when running, is to keep Z pressed down and tap like mad on either one of the Shifts.

As with all methods there is one small problem. If another key, apart from Z and Shift is pressed your man stops running and Z has to be depressed and pressed again to remedy the problem. – **Hon Li, Faberstown, Nr. Andover, Hants.**

● Well done young man, but our expert can equal your time without cheating.

Larger disc titles

I THINK your magazine is great and there are lots of good things to read.

Could you tell me how to make titles on discs longer so I can put in colour and more words? – **Paul Gilliam, Sharow, Ripon.**

● Disc titles are limited to 12 characters. This limit cannot be increased without changing the disc filing system's software.

It should also be noted that a control code, such as colour, counts as a single character and can be entered in the disc title as normal using the function keys.

Rugby union plea

I HAVE been trying desperately for about two years now to find a rugby union program.

I have written to many software houses to see if there are any future plans to produce a rugby union program – as I'm certain there are no commercial programs, or listings available – and always been met with a negative answer. Or the ultimate in stupidity – why not write one yourself?

Therefore, I am asking des-

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perately again, do you know of anyone who may have written a rugby union program?

Surely there must be some Twickenham mad micro boffin with a Beeb somewhere.

I would greatly appreciate any help you could give. – **Stuart Roscoe, Fleckney, Leicestershire.**

A software diagnosis

WITH reference to the letter of K. Pigge of The Hague and his trouble with the AUTO command and a little white dot that appears on the screen, I would like to suggest a software diagnosis rather than the suggested "definite memory fault".

If while programming, the screen mode is changed from Mode 7 to Mode 1 by typing Ctrl-V followed by a 1, this apparently has an identical effect to Mode 1.

But as page 383 of the User Guide points out it "is exactly equivalent . . . except that it does not change HIMEM".

This pseudo-variable, as shown in the diagram on page 500 of the User Guide is the address of the top of the Basic stack.

HIMEM is set to &7C00 in Mode 7, and remains here if the mode is changed as mentioned, near the bottom of the Mode 1 screen.

AUTO is one of the commands that uses the Basic stack, and as soon as it is invoked it can be seen to use this area. If text overwrites this visual storage area, or it scrolls off the screen, the command loses its place, and resets itself back to line 10.

Both procedures and functions also use this area. Trying to access even a non-existent function (type 'PRINT FNx') will show the stack space required.

For the more advanced programmer, the Basic stack space used by functions is best illustrated with recursive functions. For example, after entering Mode 1 as described, define the recursive function:

```
10 DEFFNsum(X%) :IF X%=1
THEN =1 ELSE = FNsum( X%
-1)+X%
```

Then in immediate mode, type:

```
PRINT FNsum(600)
```

You will be able to see why recursive functions are wasteful on memory.

The moral of this tale is never change mode other than by using the MODE command unless you know the exceptions. – **Ian Tresman, Elstree, Herts.**

Number-to-string alert

I BOUGHT my BBC Model B in early December last year. It has Operating System 1.2. It also has some idiosyncracies in handling number-to-string conversions.

For instance:

A=57.6 : PRINT LEN(STR$(A)) *returns 11 instead of 4.*
A=48.82 : PRINT LEN(STR$(A)) *returns 11 instead of 5.*
A=522.44 : PRINT STR$(A) *returns 522.4400001.*

Many number-to-string conversions are handled correctly. When I went back to the shop suspecting that I had a rogue machine, it was discovered that all the BBC Micros in the shop performed similarly with the examples given above.

So does my brother-in-law's machine, bought last autumn, but not that of a work colleague who got a BBC Model A last spring.

I have written to Acorn, of course, but do not expect a very quick reply.

It is a real nuisance because it stops data entry verification routines which check the length of an INPUT, and it plays havoc with screen formatting if numeric data is being handled in the string equivalent.

I thought your readers might welcome this warning.

Thank you for a good read. I'm sure to get good value from my annual subscription for The Micro User. – **C.J. Rourke, Watford, Herts.**

Self deleting downloader

AS a newcomer to the world of discs, I encountered the dreaded "No room" and "Bad mode" error messages.

The problem, of course, is solved by using a downloading routine. This involves setting up a function key with the required program to do so.

However, usual methods require you to set the function key up, then load the program and finally press the function key. Although this is effective, I decided that it was too much bother.

Below is a self-deleting downloader, which should be placed at the start of the program.

Thanks for a superb mag.

```
1 IF PAGE = &E00 THEN 5
2 *KEY 0 *TAPE |M
D%=PAGE-&E00: FOR L%=PAGE
TO TOP STEP 4
:!(L%-D%)=!L%: NEXT:
PAGE=&E00 |M OLD |M DEL.1,4
 M RUN |M
3 *FX 138,0,128
4 END
5 REM Rest of program
```

– **David Price, Buxton, Derbyshire.**

Thanks for Big Letters

A BIG thank you for the Big Letters article and listings in the May issue of The Micro User. This was just what I was looking for!

The program runs perfectly on my Electron, and can easily be made interactive by the addition of the lines:

```
INPUT a$:PROCwriteword
(x,y,a$):
```

as appropriate.

This was my first encounter with a machine code program, and unfortunately the article did not explain how to save it so that extra copies could be made.

A friend with a BBC micro advised me to:

```
*SAVE "FCODE" D02 DFF D02
```

This seems to work OK. Is this the best way to do it?

Thanks again to Mike Bibby and your magazine for providing such a useful program. – **David Carr, Upper Hutt, New Zealand.**

● Nice to know Big Letters has proved so useful. Since it's been published it's turned up in all sorts of programs – look at the title page of Micro Olympics!

The way of saving the code you describe is fine, providing you've already assembled the code. Being lazy, if we wanted an extra copy, we'd simply run the program again.

Help to stop head banging

RECENTLY I bought the S-Pascal disc with the intention of getting to grips with this language.

There are however some mistakes in the User Manual supplied with my disc, so with much head banging against the wall, pulling out of hair and some very helpful advice from those nice people at Acornsoft I pass on a few tips to anyone who cares to use this piece of software.

To be able to enter your own source code – Pascal program – and save it, the following sequence of events must be followed.

*1. Boot loader, Shift and Break, 2. Type *EDIT Lists program "HELLO", 3. Type NEW (not *NEW) Erases loader.*

*You may now type in your own source program, supplying your own line numbers or type AUTO for the automatic line numbering facility (*NEW does some horrible things to the*

● ***Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

program you have so carefully typed in).

To edit your program, use the normal editing facilities. That is the cursor keys, Delete and Copy as the case may be. CLS and LIST or L. also work.

*You can also save your program directly at this stage, in case you lose it when compiling. Do not use Escape, and *EDIT will only list your program again.*

*Next step is to *COMPILE your source program. If it fails then pressing any key (well Shift does not for a start) will display the program on the screen.*

*Use the normal on screen editing facilities to correct the program. Save the program and *COMPILE again. Repeat as many times as necessary.*

**COMPILING gives a complete assembler listing of the machine code generated (useful stuff this!). It is a two pass assembler.*

If you have a printer and use fan fold paper, position the paper at the start of a page. This usually means that the first page is left empty and can be used as "rough".

Turn the printer on; it will recognise this position as being line one. Enable the printer either by Ctrl B or VDU2.

*Type *COMPILE. When it has finished listing the assembler (twice) press any key to get a listing of the program. Next type *GO.*

The result will be that the assembler will be listed at the start of a page. The program listing will also start on a fresh page, as will be the output from the program.

All very neat indeed. – **C.B. Geiser, Nazca Software, Ilford, Essex.**

Finding those hidden PROCs

I HAVE a superb way of finding which lines PROCs hide at in a program without searching all the way through it.

This is done by making a list of the line numbers where the DEFPROC occurs and including them at the start of the program.

The list consists of GOTO statements which point to the PROCs. For example the program may look like this:

```
10 GOTO150
20 GOTO212 Dead
30 GOTO402 Screen
40 REM The rest of your PROCs
"
"
150 REM Start of program
"
212 DEFPROCDead
"
402 DEFPROCScreen
```

When the program is renumbered, the list of GOTO statements is updated. The GOTO at the start of the program jumps round the list of GOTOs, therefore the list is never executed.

I hope this will be of use to your readers. – **T.W. Blunt, Berkshire.**

Dummies are the answer

IS it possible to get an underlined, centred, heading using Wordwise and an Epson FX80 printer?

I have tried various configurations of the CE and OC codes, but I always finish up with the leading spaces underlined.

I can overcome this habit of my FX80 in my own program by printing spaces before I send the underline code, but Wordwise does not seem to do this. – **Brian Kingham, Skegness, Lincs.**

● Unfortunately the only way to centre and underline headings using Wordwise is to put dummy spaces followed by the required control codes.

Your're quite correct!

I RAISE two points concerning the September 1984 issue of The Micro User.

The circuit on page 140 (frequency meter) will not work as printed. The +5v must go to pin 4 of the LM324 and not pin 5 as indicated.

On page 179, I.A. Padgett writes about a Speedier Micro. Either I'm going mad or my machine is, but with DFS and Basic 2, the loop executes no faster.

What does happen is that the

→

The dreaded 19th letter

IMAGINE a body of men proclaiming that you are no longer allowed to employ the 19th letter of the alphabet in anything you write. For all your life that letter has been permitted, but now unexpectedly no longer may you include it in any writing.

In order to remain a good citizen, you yield to the demand and the 19th letter of the alphabet you no longer include in your writing.

For, they proclaim, if you are very careful you can avoid including that letter in everything you do, even though it may give you more than one problem.

I believe a gentleman proclaimed that if you employ that letter even one time, you might do it a hundred times, and that could be hard for anyone to read, finding the forbidden letter repeated frequently.

Your writing could end up like a lot of macaroni, I think they remarked.

Advice of a like kind one can additionally hear proclaimed about the employment of a certain four-letter word thought not to be not good to include in any BBC Micro program.

A word that may bring about branching to a numbered line of the program.

For while any child can comprehend a certain board game wherein more than one venom-giving reptile and more than one ladder are found, an adult reading a program full of branching may become bewildered.

Other methods are advocated, concealing the non-complicated branch in a device called a PROC. For while a non-complicated branch to a line number may be muddling, a PROC branch to a part of the code it can take a minute or two to find, be oddly thought a great improvement.

If the dialect of the number-one-micro computer-language I cannot actually name (on account of the fact that in it one can find the forbidden 19th letter of the alphabet) had not the ability to allow PROC and more PROC, then who can tell, the forbidden four-letter command might after all be permitted.

But unfortunately, the BBC Micro's friendly language does allow the PROC, and moreover, the employment of more than one item of code divided by a colon.

For that the above feature be allowed, the forbidden branching command be not. Unfortunately, the language of the BBC will not allow the effective employment of more than one antonym of THEN (another four-letter command regrettably featuring the 19th letter).

If one could include the antonym of THEN more than once on a line, then with greater facility might one avoid the dreaded branching word.

But the employment of truly "bird-twig-homed" IF and IF be unhappily not a feature of the BBC friendly program language.

But I have tumbled upon a way out of the above dilemma, which really be very non-complicated.

Never reveal your programming to anyone who might condemn you for any open-minded approach.

Make employment of the dreaded branching word in the privacy of your own floppything.

Or maybe campaign for an edition of the language in which the PROC and multithing are not featured.

Likewise, be bold and say, blast the rules, I need an S to sign my own name! – **Colin M. Johnson, Hythe, Kent.**

MICROMAIL

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timer (TIME) runs more slowly, giving the impression of a faster time.

Checked against a stopwatch, increasing &FE45/46 to 255 makes no difference to the speed. – **David Andrews, Harrogate, North Yorks.**

● We are grateful for your observations regarding the technical drawing in the Body Building course and you are quite correct.

Your points regarding Speedier Micro are also correct. Your letter is one of many contributions we have had on this subject.

Internal sort routine

I HAVE recently had to develop an internal sort routine to order a number of records specified by DIM record$(table_size%).

What I did was extract keys into an array DIM key$(table_size%). The sort, listed below, sorts on ascending key sequence. – **Address in Elgin, Moray, but no name supplied.**

```
   10 DEF PROCsort
   20 FOR a%=1 TO table_siz
e%
   30   FOR n%=(a%+1) TO ta
ble_size%
   35       IF key$(n%) >= k
ey$(a%) THEN GOTO 120
   40   key$(0)=key$(n%)
   50   record$(0)=record$(
n%)
   60   FOR o%=(n%-1) TO a%
 STEP -1
   70     key$(o%+1)=key$(o
%)
   80     record$(o%+1)=rec
ord$(o%)
   90   NEXT o%
  100   key$(a%)=key$(0)
  110   record$(a%)=record$
(0)
  120   NEXT n%
  130 NEXT a%
  140ENDPROC
```

Unstoppable Basic

COULD you tell me how to make my Basic programs unstoppable?

*I used *FX220,8 to disable the Esc key while still allowing the action of escape using Ctrl+H.*

*For Break I have been using *KEY10 and so on but this is not really acceptable as it reRUNs the program from the beginning.*

It would be much better if it could continue like those Spectrum gadgets.

Recently the kids in my school have discovered how destructive they can be with Ctrl+Break, Shift+Break, Ctrl+Shift+Break – the latter only works on one of the machines.

*Hence in order to help the teachers, is it possible to make the O.S. ignore Break and all such variations of it in a similar way to which *FX200,1 turns off the Esc key, hence making it unstoppable to those who can't reach the power switch?* – **John Davies, Newport, Gwent.**

PS. *I think I know BBC Basic pretty well now, so I want to master 6502 machine code – which book(s) do you recommend? Also does anyone know of an ENVELOPE for the BBC's sound, that sounds anything like a piano?*

● The answer to your first question you will find in the August issue of *The Micro User.*

In answer to your second question is that we have found the Shiva book on BBC Machine Code by Bruce Smith very helpful.

Finally, the following should help you with your piano sound:

```
ENVELOPE 1,1,1,-1,0,1,1,-1,
127,-2,-1,-15,126,50
SOUND 1,1,54,20
```

Staggering response!

I REFER to your publication of my letter in the August edition of The Micro User asking for help in writing a pottery program, and request that you thank your readers and your staff for their assistance.

Please, no more solutions though. The response was staggering!

Thank you for taking the time and effort to help me. – **Neil Robertson, Stonehaven, Scotland.**

Regard it as ordinary

COULD you tell me the correct method of typing in the program when using the special formatter which breaks one program line

---

Setting the Escape trap!

FIRST, let me add my praise for being the first magazine to actually show an honest opinion, and not praising all the time.

I am a beginner in machine code, and I purchased Assembly Programming Made Easy For The BBC Micro by Ian Murray. I decided to change one of my early Basic programs to machine code.

*How do you trap Escape, such as ON ERROR GOTO or *FX220,x and BREAK, such as *KEY 10 OLD:M RUN:M in machine code.*

I would be grateful if you could print the commands, and how to use them in the magazine. – **David Trounce, Stafford.**

● Trapping the Escape and Break key in machine code involves executing several *FX commands.

To simulate the *FX command in machine code involves setting the A, X and Y registers to their appropriate values and calling the OSBYTE subroutine, which is located at &FFF4. *FX200,1 will disable the Escape. its machine code equivalent is:

```
   10 FORL=0 TO 2 STEP 2
   20 P%=&980
   30 [OPTL
   40 LDA #200
   50 LDX #1
   60 LDY #0
   70 JSR &FFF4
   80 RTS
   90 ]NEXT
   95 CALL&980
```

Disabling the Break key involves changing the Break intercept code. This is done by using the *FX calls 247 and 249 inclusive.

*FX247,76 will indicate to the operating system that a JMP instruction will occur when Break is pressed. *FX248 and *FX249 correspond to the low and high byte of intercept code address. For example, a routine at &904 can be executed on Break by entering:

```
*FX 247,76 <Return>
*FX 248,4  <Return>
*FX 249,9  <Return>
```

The machine code equivalent is:

```
  100 FORL=0 TO 2 STEP 2
  105 P%=&980
  110 [OPTL
  120 LDA #247
  130 LDX #76
  140 LDY #0
  150 JSR &FFF4
  160 LDA #248
  170 LDX #4
  180 JSR &FFF4
  190 LDA #248
  200 LDX #9
  210 JSR &FFF4
  220 RTS
  230 ]NEXT
  240 CALL&980
```

The only way you can ever totally escape the effects of the Break key, though, is to physically disconnect it.

Ian Birnbaum's "Assembly Language Programming", by MacMillan, now into its second edition, covers a random number generator.

over several lines of listing. – **E. Clark, Chesham, Bucks.**

● The formatter is used for ease of reading a listing. It should be regarded as an ordinary listing when entering the information.

For example:

```
   10 MODE7
      :PRINT "HELLO"
      :FOR X=1 TO 10
      :ETC
```

should be entered as:

```
10 MODE7 :PRINT "HELLO"
:FOR X=1 TO 10 :ETC
```

We hope this helps. In fact, we have ceased to format listings.

Harpsichord envelope

I AM developing a music program and I lack one thing – the ENVELOPE statement for a harpsichord.

Congratulations on an interesting magazine. I have been reading it from the first issue. – **J. Allison, Warrington, Cheshire.**

● Can any of our regulars take up the challenge? You haven't let us down yet.

Getting them to collide

I HAVE had a BBC Model B for about nine months and have been using it for games and business type programs.

I've had difficulty writing games. I can't get characters to 'know' when they've collided.

I've tried POINT, but it doesn't always work, and I've tried using the coordinates of characters, but that's long winded.

Is there any other way of getting them to collide?

Also, is it possible to get the BBC to talk without buying a special chip? – **David Stone, Berinsfield, Oxford.**

● You will find that the POINT command will work, if the correct X and Y coordinates are given.

If you cannot get this method to work then you will have to use the more long winded X and Y coordinate checking routine.

Both the routines above are used in many of the games in *The Micro User*.

Read through some of them and see how the methods have been implemented.

Through the back door

AFTER reading your column in the August issue of The Micro User informing BBC users how to "Make your Basic programs unlistable" I found I was unable to get into my program for debugging reasons.

Could you please tell me how to put a back door into my program as my two friends and I have spent many unsuccessful hours trying to write one ourselves. – **Richard, Richard and Marco, Clacton, Essex.**

● I'm afraid your problems are of your own making. To make a Basic program 'unlistable' before it is finished is a bit silly.

Your problem will be solved if you remove the control characters and only add them when you are certain your program is complete.

Even then you should always keep a listable version for your own use.

However if you have used exactly the method described in the letter, it can be reversed by the following:

```
!(PAGE+5)=&2A2A2A2A
!(PAGE+9)=&2A2A2A2A
```

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MICROMAIL

65CO2 instructions

IN your September 1984 issue you gave a list of the extra instructions that the 65C02 offers.

For readers who are interested, the Rockwell chip will set the flags correctly when using the BIT immediate command – as shown in Table 1 – whereas the GTE chip used in the second processor will fail as the main body of the article correctly points out. – **Stuart Morris, Liverpool.**

● Thank you for the information. We would also like to point out that the table of extra commands has a block of opcodes apparently out of place.

They are in the correct order, but should have appeared two lines down – that is, PHY-&5A and so on until JMP (abs,x)-&7C.

Disabling the Break key

*HOW can I disable the Break key? By this I do not mean *KEY 10 OLD|MRUN|M but a *FX command like *FX 229,1 used for Esc.*

I went to the BBC Micro exhibition in Manchester about a year ago where one person on the Acorn stand said that if I cut a wire in the micro it would disable it.

I'm not going to cut off the Break key for good or I could well have problems!

Also how do I put a mode command in with procedures? I have a single drive, double sided AMS 3in disc drive, the OS 1.2, and View A1.4.

I think these have taken a lot of memory but all commercial games work. I can't figure it out and my program doesn't work. – **Gordon Price, Monmouth, Gwent.**

● The answer to the first part of your letter is that you cannot disable the Break key using software.

You are not allowed to change mode within a function or procedure.

When an attempt is made to do so, the error message "No room" is produced.

A more appropriate message would be "Bad mode within FN/PROC".

If you use the VDU22,n command, where n corresponds to the screen mode required, that mode will be entered.

But it is not advisable to use this method, as the value of HIMEM is not taken into account.

Swooping on the eggs

FOLLOWING your articles on ways to cheat in Acornsoft games I have found how to remove the eggs in the game Swoop.

Simply type: CALL &2800.

The title page will reappear and one can continue the game, but pressing Esc returns it to its original form. – **Charles Thackeray, Yeovil, Somerset.**

And finally, with tongue firmly in cheek . . .

Another dragon called A.

Dear Trev,

Sorry it's been so long since I've been in touch but I've been indulging in a bit of speleology (look it up). And I'm still in the dark.

It all started when Clive crept up behind me at a meeting of the Romchester Rogues. One of the whiz kids (known as Spot) was trying to explain to me what an OSBYTE is.

"Bitten off a bit more than you can chew there, old boy", boomed Clive in my ear.

"Here, have a look at this sometime", he muttered furtively, shoving a tape in my hand. I'm off to the lecture on unbreakable protection by B&F. It's being held in the room where all the laughter's coming from".

I eyed the cassette dubiously. I've had unsolicited gifts from Clive before and not always liked what I've found. In fact, I've never had a bacon butty since the last one. And Andrea has insisted on inspecting all my tapes "in case Nigel sees one".

Myself, I think Nigel had written the damn thing. Certainly he has a sort of porcine look to him in dim light.

Still in for a penny and all that (anyway the tape was free). When I got home Andrea was out at her bellringing which meant that she wouldn't be back till long after closing time (which, on these occasions, she calls "closing chimes"). Free from disturbance I ran the program.

PERILOUS POT appeared on the screen in blood red letters and from then on I was hooked.

I'd never played an adventure game before. Of course I've read all Alice's articles and even understood some of the jokes, but I've never actually dared play one.

I mean, you read the sports pages in the Sunday paper but you don't take on Seb Coe (who I could have done with at one stage of the Perilous Pot).

I've always said I'm waiting for the day when Alice and Mike Cook collaborate, writing an adventure where you have to wander the corridors of Watford Electronics collecting the components for a Body Building pack.

As it was I entered the Perilous Pot without a moment's hesitation. Well, that's not actually true, I spent the best part of an hour wandering round a forest looking down into a valley.

Eventually I sussed it, collected my lantern, food, water, keys and so on and headed for the cavern entrance. I even managed to unlock the gate.

DESCEND HOLE I typed intrepidly. ARE YOU SURE, DUCKY? came the reply. I might have known it was one of Clive's specials.

YES I typed furiously.

DON'T GET YOUR PASSAGES IN A TWIST the micro lisped and I was in the first chamber.

At this point Andrea arrived breathing out clouds of what she insists on calling the "odour of sanctity". "Don't mind me, I'll just watch", she said. I did and she didn't.

OOH, ISN'T IT DARK IN HERE? purred the program.

I did a quick INVENTORY and typed LIGHT LAMP.

"You can't do that", said Andrea", it didn't say you had matches".

"It's a torch", I seethed.

"Go on then, I won't say another word". True to her word she started humming Amazing Grace.

Into the pot I plunged, putting a bat in a cage ("Cruel" pouted A.), picking up the rusty wand (ignoring A.'s remarks) and hunting for the treasure I had to find, the Wizard's Horn Of Plenty.

The calamity came when I met the dragon. Trying to retreat all I got was A BIG STRONG BOY LIKE YOU?

The problem was that I couldn't get past without telling it its name and the only way to get the name was to play a game of riddles with the pink dwarf that had been following me.

You know the sort of thing, "My first is in Acorn but not in Stock" and so on.

Well, I should have known that Clive would have arranged something special. And really, the dragon's name was quite apt. But did Andrea have to be there as I typed it in? She didn't get it and now neither do I.

So, I'm now past one dragon named Andrea but I could do with a cave to hide myself from the real one. All I get from her are game instructions like:

DROP DEAD

and

SLING HOOK

I wonder if Alice does marriage guidance on the side?

Life is strange, cheers,

Bob

P.S. I'm writing to Alice to see if he knows a way of getting the dwarf out of the closet.

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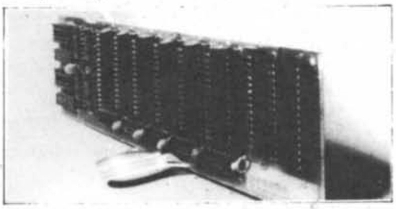

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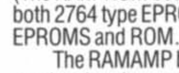

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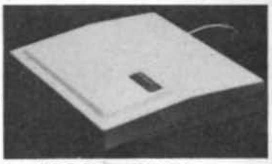

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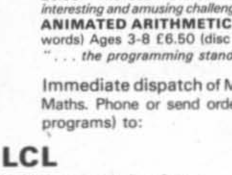

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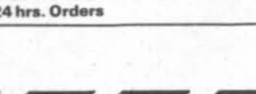

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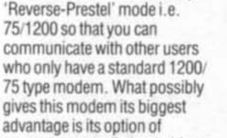

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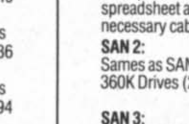

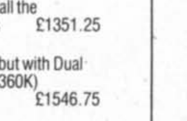

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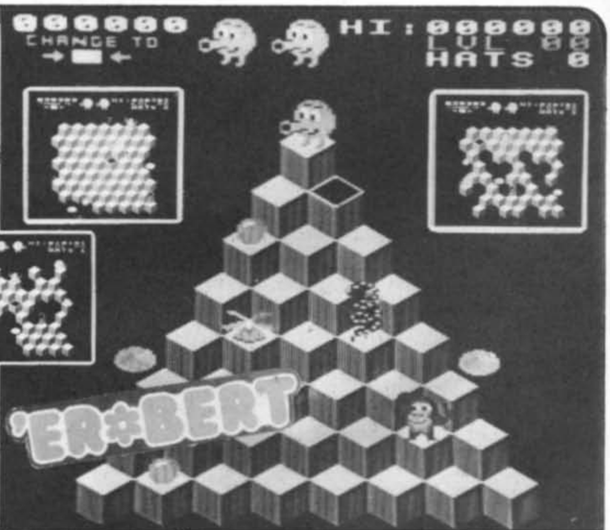

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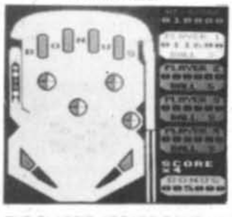

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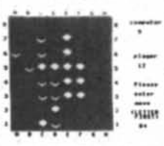

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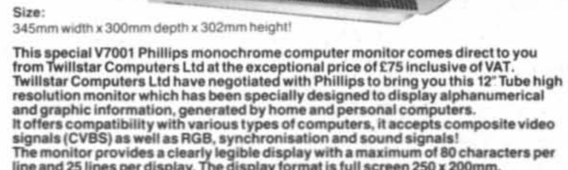

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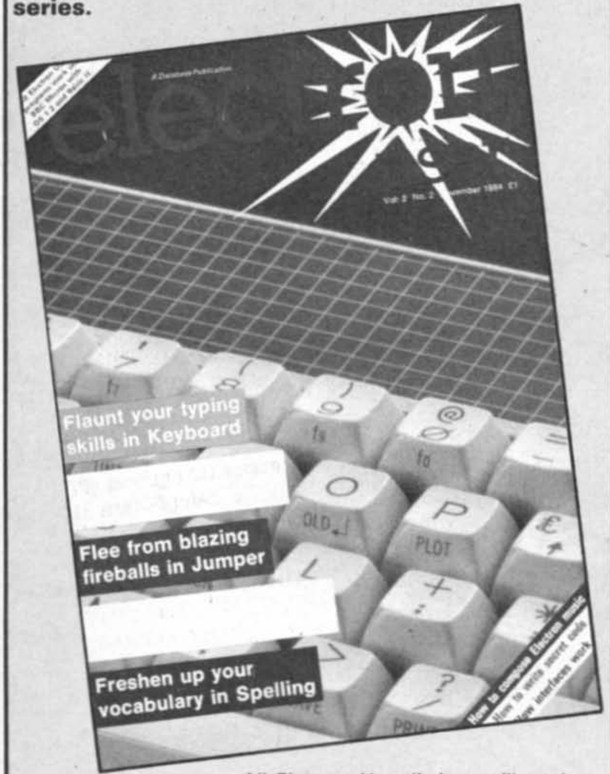
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A Database Publication
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Flaunt your typing skills in Keyboard
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How interfaces work

All Electron User listings will work on BBC Micros with OS 1.2 and Basic II. Even with Basic I machines and earlier OSs the vast majority of the programs will work without modification.

November sees the second in our series on taming the Electron's sound capabilities. For games freaks Roland Waddilove provides his Star Fighter while conservationists can blight the planners with Urban Sprawl. On the educational side there are programs to check out your spelling and help you learn your way around the keyboard. For hardware freaks there's an article on how joystick interfaces work while our reviewers tackle Slogger's ROM box and Mushroom's printer port. With beginners tackling arrays, a foray into Caesar Cipher and an assembly language wrap-around screen, it's the most interesting issue yet.

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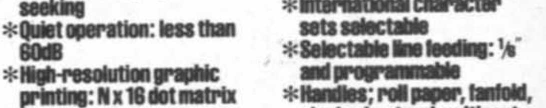

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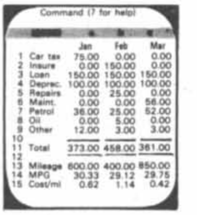

```
        Command (7 for help)

               Jan     Feb     Mar
 1 Car tax    75.00    0.00    0.00
 2 Insure      0.00  150.00    0.00
 3 Loan      150.00  150.00  150.00
 4 Deprec.   100.00  100.00  100.00
 5 Repairs     0.00   25.00    0.00
 6 Maint.      0.00    0.00   56.00
 7 Petrol     36.00   25.00   52.00
 8 Oil         0.00    5.00    0.00
 9 Other      12.00    3.00    3.00
10
11 Total     373.00  458.00  361.00
12
13 Mileage   600.00  400.00  850.00
14 MPG        30.33   29.12   29.75
15 Cost/mi     0.62    1.14    0.42
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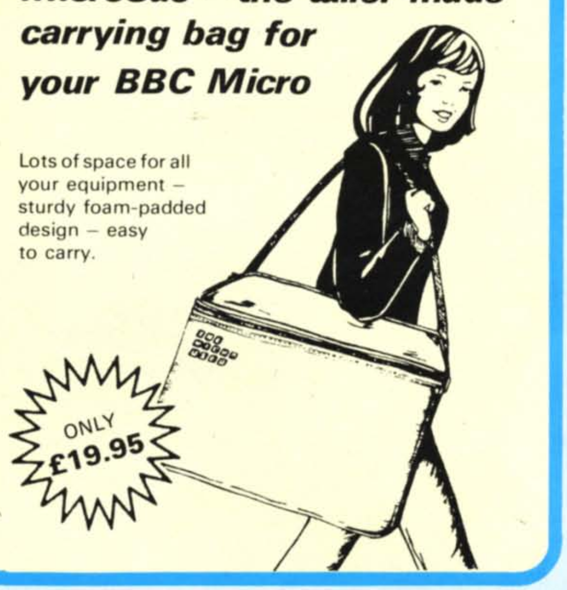

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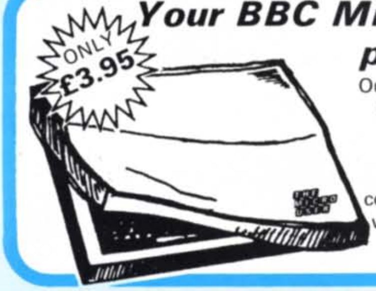

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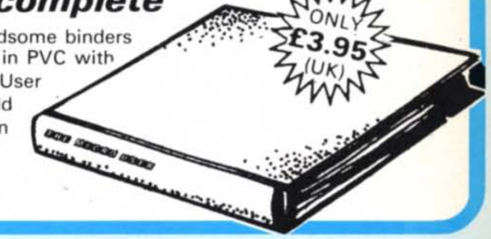

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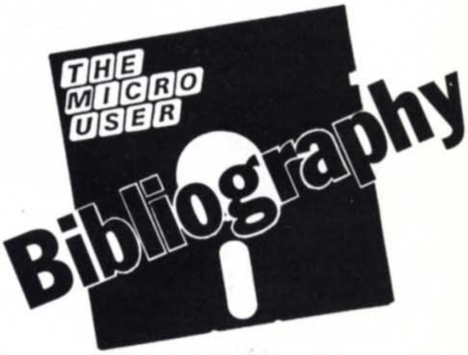

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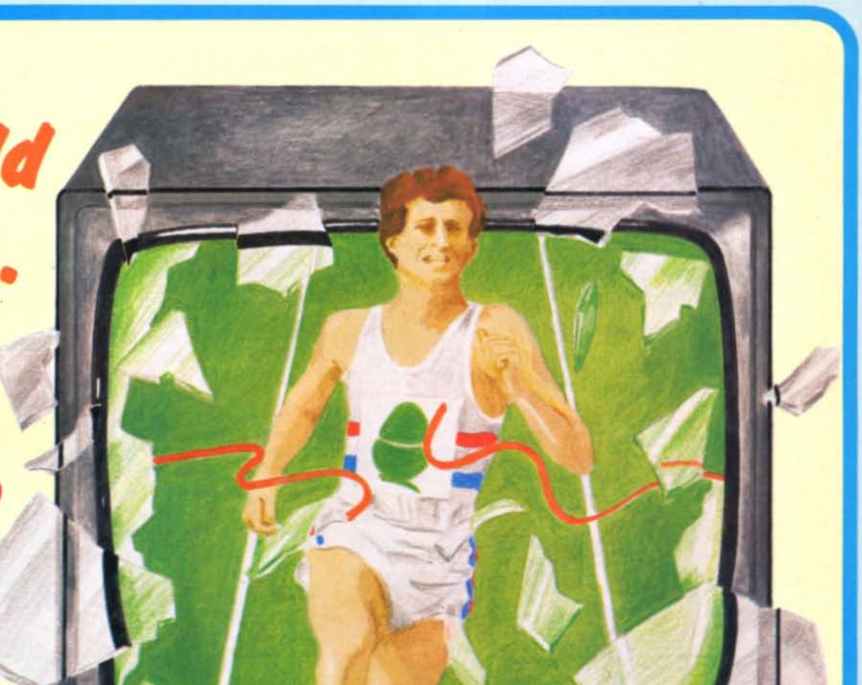

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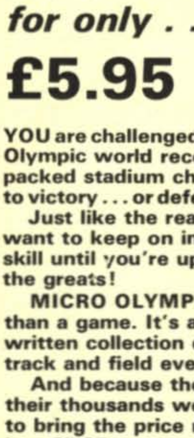

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MARCH 1983: Deathwatch, a superb arcade game **Bingo,** clever uses of the randomise function; **Bubblesort** routines; **Tests** function keys in machine code. 0.1 **Colour** and **Graphics Routines:** create a kaleidoscope of screen designs.

APRIL: King Kong, rescue girls from the Empire State Building before killing Kong. **Nim,** a structural game of strategy. **Tokens,** unravel the Basic ROM; **Formatter,** an essential disc utility; **Disassem,** a full machine code disassembler.

MAY: Air Strike, a fast and furious arcade game; Test your mental powers with **Pelmanism; Anagrams,** the word game. **Character,** generate vertical and inverted text. **Teletext,** animation in Mode 7. **Beeb,** two joystick exercises.

JUNE: Space Pilot, lost in space you must fight off repeated attacks from alien life forms. **Nomism,** you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. **Colourful Characters Plus** other listings from the June issue.

JULY: Tenpin, a simulation of Tenpin Bowling; **Spacepods,** beat the alien hordes; **Cup,** exciting 3D graphics techniques **Test** and **Steady,** programs to accompany the Beeb Body Building Course. **Breakfix,** don't let Break destroy your precious variables!

AUGUST: Fruities, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. **Animation,** a suite of programs that really bring your screen alive; **Casdisc,** the machine code downloader for your disc system; **Mode 7** colour routines.

SEPTEMBER: Robin & Marian, rescue Maid Marian from the Sheriff of Nottingham. **Galactic Invaders,** an exciting arcade game. **DFS Benchmarks,** 14 DFS test programs. **Animation,** new techniques. **Terminal,** connect a BBC Micro to a mainframe.

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NOVEMBER: Goblins, an enchanted journey. **Blackjack,** the casino favourite. **Charge** and **Pendulum,** Body Building Course part 9. **Sideways,** programs in ROMs. **Pendraw,** a light pen sketching program. **Plus** all the programs from the second Electron User.

DECEMBER: Tower, rescue London's treasure. **Santa,** help Father Christmas. **VDU 23,** an invaluable character defining utility. **Paged,** graphic techniques. **Plus** all the listings from the third issue of Electron User.

JANUARY 1984: Barrels, an all-action arcade game. **Noteplay,** an entertaining musical utility. **Dump1** and **Dump2,** multitone screen dumps. All the programs from our **Sound, Beginners'** and **Graphics** articles **Plus** 12 programs from the fourth Electron User.

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MARCH: Mazemunch, blockbusting arcade action. **Birthday,** family fun for our anniversary. **Derrick,** number fun for infants. **Pixelpen,** high resolution for lightpens.

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JUNE: Roadracer, 3D driving action. **Quadline,** four-in-a-line logic game. **Monitor,** machine code debugging routines. **Toolkit** 8271 disc controller explored. **Areas,** easy maths. **Spell,** spelling education.

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AUGUST: Castle, an enthralling adventure program. **Gridman,** a high speed game of strategy. **Tedit,** a superb Teletext editor. **Dsquare,** simple number fun. **Dedit,** a versatile disc editor. **Input,** the ultimate general input routine. **Bells,** Alice's mini-adventure.

SEPTEMBER: Villains, save your crystals from the evil onslaught. **Rollerball,** an intriguing game of strategy and agility. **Microterm,** communications terminal software. **T/Textdump,** high quality Mode 7 screen dump. **Numbersign,** simple number skills test for infants. **Fmeter,** four body building programs.

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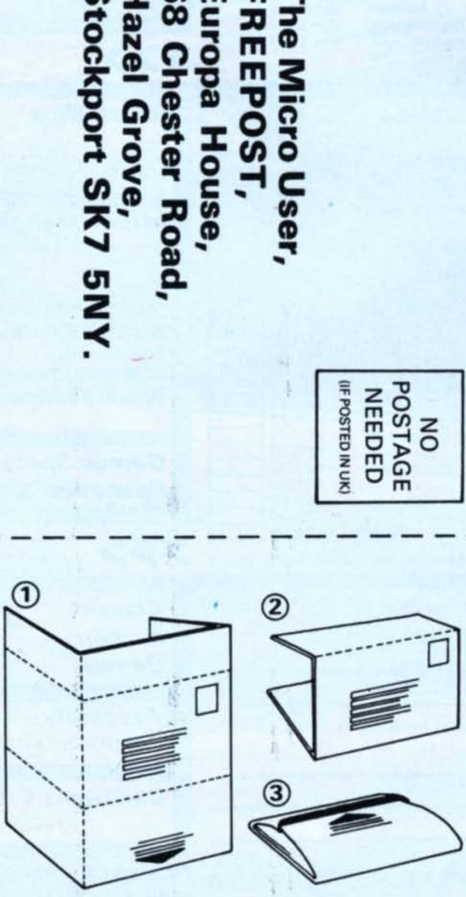

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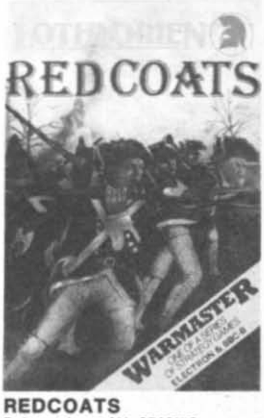

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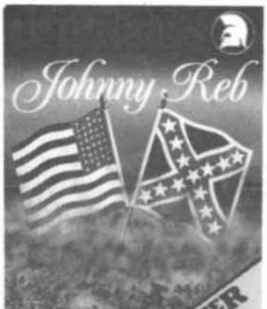

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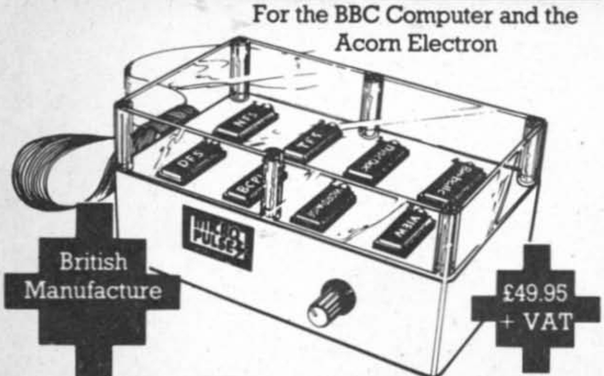

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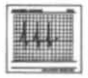

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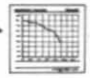

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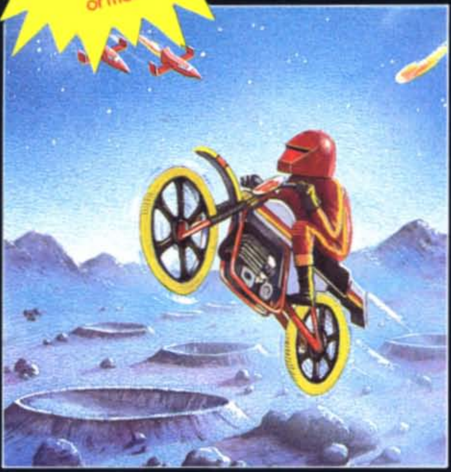

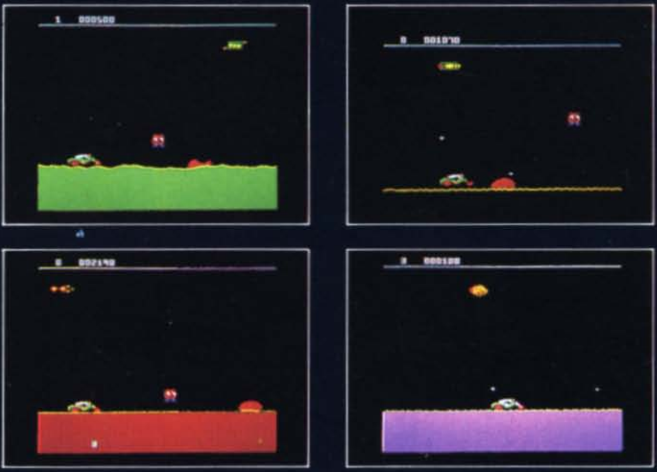

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